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UK METEOROLOGICAL OFFICE
GLOBAL DATA MONITORING REPORT

December 1999

Data Assimilation
Meteorological Office
London Rd
Bracknell
Berkshire
RG12 2SZ

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1. Introduction

As the WMO-appointed lead centre for monitoring surface marine data, the U.K. Meteorological Office produces monthly statistics on the quality of these observations received at RSMC Bracknell. This report includes this information along with statistics for most other types of data. The figures and tables contained herein are presented according to the agreed standards for the exchange of monitoring results.

The report is based on data received at the UK Meteorological Office Headquarters, Bracknell in time for inclusion into the appropriate analysis (the current cut-off time is approximately 7.2 hours after each analysis time). The evaluation of data quality is based on comparison with the appropriate 6-hour global model forecast (background field). Generally, the background field is of high quality except in data sparse areas, tropical regions and areas close to steep orography where care should be taken in interpreting the statistics shown.

Comments or queries on the report are welcome and should be addressed to:-

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2 Global Data Monitoring Statistics

Ships, Fixed buoys, Platforms and Drifting buoys observations

TABLES 1-2 contain lists of the stations which are considered to have returned suspect observations of pressure, windspeed, wind direction or temperature, as appropriate, during the month. The criteria for quality control are given on the header page for each table.

Figures 1 and 2 show 10 degree lat/long box average numbers of SHIP/SYNOP and DRIFTER observations received per day throughout the month at Bracknell and assimilated into model runs. Only data from the main hours of 00 UTC, 06 UTC, 12UTC and 18 UTC are included. Box average values are plotted as the nearest whole number (values of x.5 are rounded up). Where the average is more than 999, then 999 is plotted. A box with no observations is blank. If the 24 hour average >0 but <0.5, then 0 is plotted.

Synop Observations

Table 3 contains a list of stations which are considered to have returned suspect observations of Pressure during the month. The criteria for quality control are given in the header page. The reporting practice of each station is included in the list of statistics.

At the UK Met. Office, we monitor SYNOP pressure after it has been interpolated to our Global NWP Model's surface height. For most synoptic stations (about 75%), the surface pressure (at the model surface) is calculated from the reported station-level pressure, or, if this is not available, the height of a standard pressure-level (e.g. 850 hPa or 700 hPa). If neither of these are available, or if the reported station-level pressure is deemed unreliable, the reported mean sea-level pressure is used (about 25% of SYNOPs).

Aircraft observations

TABLE 4 contains a list of statistics calculated from data received from all airline carriers.

Figure 3 shows 10 degree lat/long box average numbers of aircraft reports (in AIREP/AMDAR code, including AIREPs, ACARs, AMDARs and ASDARs) received per day throughout the month at Bracknell and assimilated into model runs in the layer 70-500 hPa. Observations with a vector wind difference (compared with the model background field) of >60 m s^{-1} have been excluded. Box average values are plotted as the nearest whole number (values of x.5 are rounded up). Where the average is more than 999, then 999 is plotted. A box with no observations is blank. If the 24 hour average >0 but <0.5, then 0 is plotted.

Figures 4-7 show wind statistics for AIREP/ASDAR (in AIREP/AMDAR code, including AIREPs, ACARs, AMDARs and ASDARs) in the layer 70-500 hPa. Observations with a vector wind difference > 60 m s^{-1} have been excluded. Statistics have not been calculated for 10 degree lat/long boxes containing <31 observations.

Figure	Parameter
4	Mean wind vectors
5	Mean observation - background wind vector
6	Mean observation-background speed (m s^{-1})
7	RMS observation-background vector (m s^{-1})

Radiosonde Observations

TABLES 5-7 contain lists of the stations which are considered to have returned suspect observations of geopotential height, vector wind or wind direction, as appropriate, during the month. The criteria for quality control are given on the header page for each table.

Figures 8 and 9 show 10 degree lat/long box average numbers of TEMP 500 hPa GEOPOTENTIAL HEIGHT and TEMP/PILOT 300 hPa WIND observations received per day throughout the month at Bracknell and assimilated into model runs. Data from all hours are included. Box average values are plotted as the nearest whole number (values of x.5 are rounded up). Where the average is more than 999, then 999 is plotted. A box with no observations is blank. If the 24 hour average >0 but <0.5, then 0 is plotted.

APPENDIX I shows details of the gross error limits used in TABLES 5 and 6 and the weights used in the RMS values in TABLE 5.

Satellite Observations

Figures 10-24 show satellite wind statistics for all geostationary satellites. All plots other than **AVAILABILITY** show average data where there are > 10 observations in a 10 degree lat/long box.

Figure	Parameter Plotted	Layer (hPa)
10	Availability/average daily number	701-1000
11	Vector mean wind (observed)	701-1000
12	Observation-background vector wind difference	701-1000
13	Mean observation-background speed differences	701-1000
14	RMS observation-background vector difference	701-1000
15	Availability/average daily number	401-700
16	Vector mean wind (observed)	401-700
17	Observation-background vector wind difference	401-700
18	Mean observation-background speed differences	401-700
19	RMS observation-background vector difference	401-700
20	Availability/average daily number	101-400
21	Vector mean wind (observed)	101-400
22	Observation-background vector wind difference	101-400
23	Mean observation-background speed differences	101-400
24	RMS observation-background vector difference	101-400

Figures 25-39 show sounding statistics from the polar orbitting satellite NOAA-15. Figure 25 shows the mean daily number of ATOVS soundings, and figures 26-39 show mean and standard deviation observation-background differences for brightness temperature, for selected channels.
N.B. The sounding data is bias-corrected (and thinned) before being assimilated in the UKMO NWP model.

Figure		Weighting function peak (hPa)
26	Mean	Surface (HIRS8)
27	SD	Surface (HIRS8)
28	Mean	700 (HIRS15)
29	SD	700 (HIRS15)
30	Mean	500-700 (HIRS11)
31	SD	500-700 (HIRS11)
32	Mean	400 (HIRS4)
33	SD	400 (HIRS4)
34	Mean	700 (AMSUA5)
35	SD	700 (AMSUA5)
36	Mean	300 (AMSUA7)
37	SD	300 (AMSUA7)
38	Mean	100 (AMSUA9)
39	RMS	100 (AMSUA9)

3 Composite Observing Systems for the North Atlantic (COSNA)

This section shows statistics for upper air (radiosonde and aircraft) and surface (drifter) data for the North Atlantic area for data received at Bracknell during the month.

TABLE 8 shows quality statistics for **Mean Sea-level Pressure, Windspeed and Wind Direction** received at Bracknell in DRIFTER code during the month for the area 10°N - 80°N, 85°W - 0°W.

TABLE 9 shows quality statistics for **Temperature and Vector Wind** received at Bracknell from aircraft during the month for the area 40°N - 70°N, 60°W - 0°W.

Table 10 - 13 show quality statistics (**Geopotential Height and Windspeed at 100 and 500 hPa**) for all TEMPSHIPS in the area bounded by 0°N - 90°N, 100°W - 40°E and selected TEMP stations within the same area.

Revisions

1. May 95 Monitoring statistics for NOAA-11 removed. Figures 25-27 now show data for NOAA-12
2. May 95 Notes giving details of observations included in wind direction statistics clarified and corrected.
3. August 95 Monitoring statistics for NOAA-14 added with figures 28-30.
4. February 96 Monitoring statistics for GOES-7 have been replaced by statistics for GOES-8 and GOES-9.
5. April 96. 500 km and 120 km SATEMs replaced by 120 km resolution temperature profiles produced locally from the radiances disseminated by NESDIS.
6. February 97 Monitoring statistics for Meteosat 5 have been replaced by statistics for Meteosat 6.
7. Sept 97 Monitoring statistics for NOAA-12 removed. Figures 25-27 now show data for NOAA-11
8. January 1998. Increase in resolution of UKMO global forecast model.
9. April 1998. GOES winds ceased on 2nd March 1998, and were replaced with GOES high resolution winds from 15th.
10. June 1998. Monitoring statistics for Meteosat-6 were replaced by monitoring statistics for Meteosat-7, from 3rd June.
11. June 1998. Corrections in our processing of radiosonde data resulted in a decrease in the number of 500hPa geopotential heights in Figure 8 of about 230 per 24 hours (compared with previous reports), and a small increase in the number of 300hPa winds in Figure 9.
12. July 1998. Meteosat-5 began transmitting winds from 2nd July, at 63 degrees East (over the Indian ocean), and this data is included in the statistics.
13. July 1998. GOES-9 (at 135W) was replaced mid-month by GOES-10 (initially at 105W, moving towards 135W).
14. February 1999. Problems with NOAA-11, and TOVS data ceased to be assimilated from 26 February.
15. March 1999. UKMO introduced 3-D VAR assimilation system on 29 March, and also began assimilating ATOVS data from NOAA-15.
16. May 1999. Included statistics for ATOVS sounding data from NOAA-15.
17. September 1999. Included statistics for high resolution visible winds from Meteosat-5 and Meteosat-7.
18. October 1999. The 3-D VAR assimilation system was upgraded on 19 October, including improvements in the assimilation of ATOVS radiances, use of SSM/I surface wind speed, an improvement in the calculation of surface pressure for SYNOPs, and thinning and revision of observation errors of aircraft data.
19. November 1999. High resolution visible winds from Meteosat-5 and Meteosat-7 removed until used operationally.

TABLE 1

MONITORING OF MARINE SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - SHIPS, FIXED BUOYS AND PLATFORMS
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from each unique identifier for ships, fixed buoys and platforms.

Standard of comparison :Background field from UKMO global model.

Observation times :00, 06, 12, 18 UTC

Elements monitored :Mean sea level pressure (hPa).
:Wind speed (m s^{-1}).
:Wind direction (Degrees).

Parameters monitored

:NOBS :Number of observations received excluding duplicates.

:NGE :Number of observations with gross errors.

:PGE :Percentage of observations with gross errors.

:SD :SD of difference of observations from background values excluding those with gross errors.

:BIAS :Mean difference of observations from background values excluding those with gross errors.
N.B. a positive bias indicates the observation is veered to the background.

:RMS :Root Mean Square difference of observations from background values excluding those with gross errors.

GROSS ERROR LIMIT :15 hPa (pressure)
:25 m s^{-1} (vector wind)

SELECTION CRITERIA :NOBS ≥ 20 , and one or more of the following:

1.|bias| ≥ 4 hPa (pressure),
≥ 5 m s^{-1} (wind speed),
≥ 30 degrees (direction).

2.SD ≥ 6 hPa (pressure),
≥ 80 degrees (direction).

3.PGE ≥ 25

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 m s^{-1}

IDENTIFIER	HOUR	ELEM	LEVEL	NOBS	NGE	PGE	SD	BIAS	RMS
MEAN SEA LEVEL PRESSURE									
ATZS	ALL	P	SUR	20	0	0	5.2	-4.1	6.6
BOAB	ALL	P	SUR	20	1	5	1.8	-5.4	5.7
ELMQ	ALL	P	SUR	20	0	0	4.1	-4.0	5.7
ELVI2	ALL	P	SUR	76	1	1	1.1	-5.4	5.5
ELVJ9	ALL	P	SUR	92	0	0	0.9	-4.0	4.1
ELWR3	ALL	P	SUR	69	0	0	5.6	-4.1	6.9
LAFQ5	ALL	P	SUR	27	0	0	2.6	-5.8	6.3
PCCQ	ALL	P	SUR	62	0	0	0.8	-6.3	6.3
P3NE5	ALL	P	SUR	20	0	0	0.9	-5.7	5.8
P3YR5	ALL	P	SUR	60	0	0	1.2	4.4	4.6
P3YS5	ALL	P	SUR	21	0	0	1.9	5.8	6.1
UCAD	ALL	P	SUR	46	0	0	3.0	-5.1	5.9
UCJL	ALL	P	SUR	37	1	3	1.2	6.8	6.9
UFNO	ALL	P	SUR	60	0	0	2.1	6.9	7.2
VDRC	ALL	P	SUR	22	0	0	2.4	-4.2	4.8
VYNG	ALL	P	SUR	34	34	100			
WDZB	ALL	P	SUR	39	0	0	0.8	-5.4	5.5
ZCAM9	ALL	P	SUR	47	0	0	2.1	7.6	7.9
3ETQ8	ALL	P	SUR	20	5	25	4.0	-3.3	5.2
3FFE8	ALL	P	SUR	21	0	0	1.6	-4.2	4.4
48102	ALL	P	SUR	140	109	78	0.4	1.6	1.6
62125	ALL	P	SUR	106	1	1	1.9	4.9	5.3
WIND SPEED									
C6JS	ALL	SPEED	SUR	40	0	0	6.1	5.9	8.5
C6NI3	ALL	SPEED	SUR	20	0	0	7.0	5.1	8.7
DEHZ	ALL	SPEED	SUR	44	0	0	7.1	6.8	9.8
DGCDFD	ALL	SPEED	SUR	40	0	0	4.9	10.1	11.2
ELVJ9	ALL	SPEED	SUR	53	0	0	5.2	5.2	7.3
ELVK2	ALL	SPEED	SUR	56	0	0	5.2	11.4	12.5
ELWC6	ALL	SPEED	SUR	24	0	0	5.8	8.4	10.3
ELXK6	ALL	SPEED	SUR	38	0	0	6.0	10.1	11.8
J8GK8	ALL	SPEED	SUR	76	0	0	5.9	10.8	12.3
LAQT2	ALL	SPEED	SUR	44	0	0	3.7	6.5	7.5
PJVQ	ALL	SPEED	SUR	48	0	0	6.3	6.7	9.2
ZCAX8	ALL	SPEED	SUR	25	0	0	7.2	6.5	9.7
3FFE8	ALL	SPEED	SUR	21	0	0	3.0	5.0	5.8
3FSL4	ALL	SPEED	SUR	41	0	0	3.2	7.2	7.8
3FWM4	ALL	SPEED	SUR	88	0	0	3.9	5.0	6.3
9HII6	ALL	SPEED	SUR	48	0	0	4.5	7.0	8.3
WIND SPEED									
VRUH8	ALL	DIRN.	SUR	21	0	0	46.4	-31.7	56.2
51018	ALL	DIRN.	SUR	58	0	0	16.1	35.2	38.7
62112	ALL	DIRN.	SUR	72	0	0	97.6	-13.8	98.5
62131	ALL	DIRN.	SUR	82	0	0	17.9	35.4	39.7

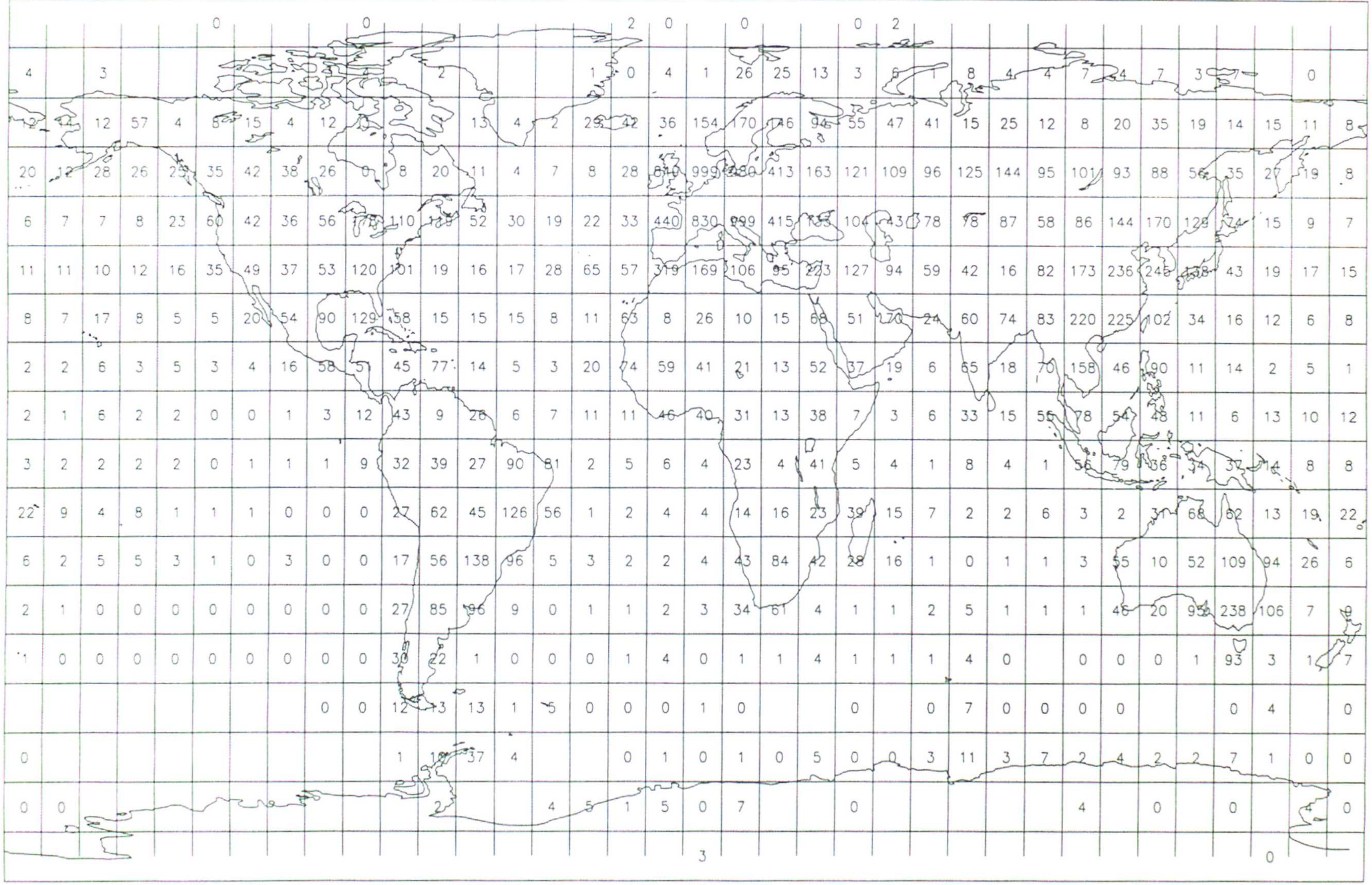
AVAILABILITY – SHIP/SYNOP – DECEMBER 1999

FIGURE 1

MAIN HOURS ONLY

10 DEGREE BOX AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS

GLOBAL AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS = 21120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20 12 28 26 25 35 42 38 26 0 8 20 11 4 7 8 28 810 999 880 413 163 121 109 96 125 144 95 101 93 88 56 35 27 19 8
6 7 7 8 23 60 42 36 56 178 110 119 52 30 19 22 33 440 830 999 415 133 104 43 78 78 87 58 86 144 170 128 74 15 9 7
11 11 10 12 16 35 49 37 53 120 101 19 16 17 28 65 57 319 169 106 95 223 127 94 59 42 16 82 173 236 245 138 43 19 17 15
8 7 17 8 5 5 20 54 90 129 58 15 15 15 8 11 63 8 26 10 15 68 51 70 24 60 74 83 220 225 102 34 16 12 6 8
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2 1 6 2 2 0 0 1 3 12 43 9 26 6 7 11 11 46 40 31 13 38 7 3 6 33 15 55 78 54 48 11 6 13 10 12
3 2 2 2 2 0 1 1 1 9 32 39 27 90 81 2 5 6 4 23 4 41 5 4 1 8 4 1 56 79 136 34 37 14 8 8
22 9 4 8 1 1 1 0 0 0 27 62 45 126 56 1 2 4 4 14 16 23 39 15 7 2 2 6 3 2 31 68 62 13 19 22
6 2 5 5 3 1 0 3 0 0 17 56 138 96 5 3 2 2 4 43 84 42 28 16 1 0 1 1 3 55 10 52 109 94 26 6
2 1 0 0 0 0 0 0 0 0 27 85 196 9 0 1 1 2 3 34 61 4 1 1 2 5 1 1 1 46 20 95 238 106 7 9
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0 0 12 13 13 1 5 0 0 0 1 0 0 0 7 0 0 0 0 0 4 0
0 1 18 37 4 0 1 0 1 0 5 0 0 3 11 3 7 2 4 2 2 7 1 0 0
0 0 2 4 5 1 5 0 7 0 4 0 0 4 0
3 0

TABLE 2

MONITORING OF MARINE SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - DRIFTING BUOYS
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for drifting buoys.
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 06, 12, 18 UTC
Elements monitored		:Mean sea level pressure (hPa). :Wind speed (m s^{-1}). :Wind direction (degrees).
Parameters monitored	:NOBS	:Number of observations received excluding duplicates.
	:NGE	:Number of observations with gross errors.
	:PGE	:Percentage of observations with gross errors.
	:SD	:SD of difference of observations from background values excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors. **N.B. a positive bias indicates the observation is veered to the background.**
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors.
GROSS ERROR LIMIT	:15 hPa	(pressure)
	:25 m s^{-1}	(vector wind)

SELECTION CRITERIA :	NOBS	≥ 20 , and one or more of the following:	
	1.|bias|	≥ 4 hPa	(pressure),
		≥ 5 m s^{-1}	(wind speed),
		≥ 30 degrees	(direction).
	2.SD	≥ 6 hPa	(pressure),
		≥ 80 degrees	(direction).
	3.PGE	≥ 25.	

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 m s^{-1}

IDENTIFIER	LAT.	LONG.	HOUR	ELEM	LEVEL	NOBS	NGE	PGE	SD	BIAS	RMS
MEAN SEA LEVEL PRESSURE											
23508	27.4	49.6	ALL	P	SUR	75	0	0	0.8	-5.8	5.8
31953	-20.8	-40.7	ALL	P	SUR	387	29	7	2.8	8.6	9.1
44517	47.3	-38.6	ALL	P	SUR	411	44	11	4.7	4.6	6.6
46768	54.5	-138.1	ALL	P	SUR	389	7	2	3.9	4.4	5.9
46910	32.5	-167.1	ALL	P	SUR	218	153	70	3.4	-3.9	5.2
52905	7.8	-179.9	ALL	P	SUR	59	0	0	2.0	-4.2	4.6
61537	41.4	4.5	ALL	P	SUR	662	287	43	3.5	-0.1	3.5
62554	34.1	-14.0	ALL	P	SUR	27	27	100			
WIND SPEED											
21612	27.7	129.0	ALL	SPEED	SUR	103	0	0	2.9	-8.3	8.8
41651	26.1	-75.4	ALL	SPEED	SUR	21	0	0	3.3	5.8	6.7
WIND DIRECTION											
14538	-11.3	63.2	ALL	DIRN.	SUR	95	0	0	27.3	-46.3	53.7
56505	-19.7	109.9	ALL	DIRN.	SUR	158	0	0	34.2	-32.2	47.0

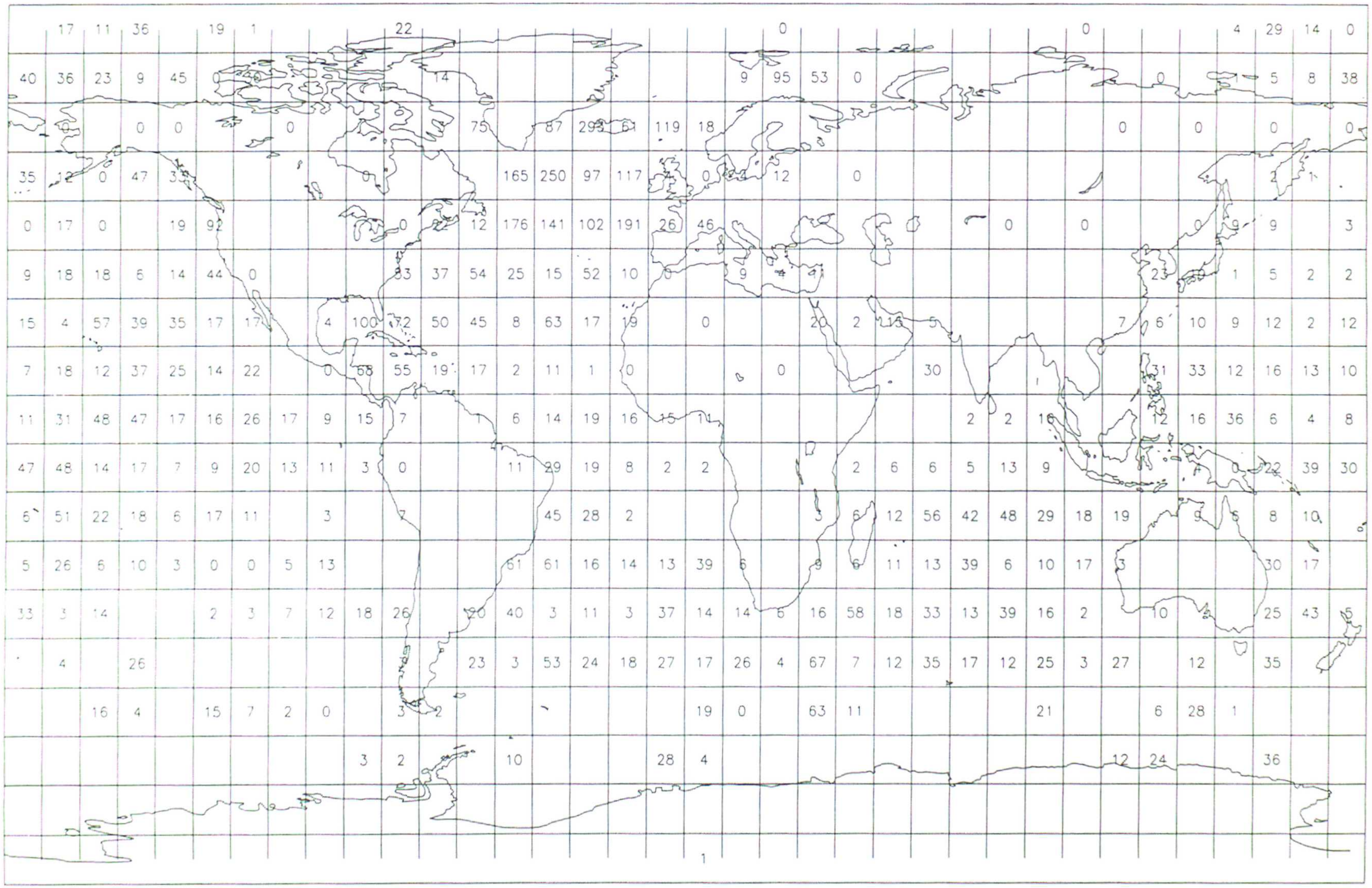
AVAILABILITY – DRIFTER – DECEMBER 1999

MAIN HOURS ONLY

10 DEGREE BOX AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS

GLOBAL AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS = 7492

FIGURE 2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0 17 0 19 92 0 22 12 176 141 102 191 26 46 0 0 0 9 9 3
9 18 18 6 14 44 0 33 37 54 25 15 52 10 0 9 41 23 0 1 5 2 2
15 4 57 39 35 17 17 4 100 72 50 45 8 63 17 19 0 20 2 15 5 7 6 10 9 12 2 12
7 18 12 37 25 14 22 0 68 55 19 17 2 11 1 0 0 30 31 33 12 16 13 10
11 31 48 47 17 16 26 17 9 15 7 1 6 14 19 16 15 11 2 2 16 12 16 36 6 4 8
47 48 14 17 7 9 20 13 11 3 0 11 29 19 8 2 2 2 6 6 5 13 9 0 22 39 30
6 51 22 18 6 17 11 3 7 45 28 2 3 6 12 56 42 48 29 18 19 9 6 8 10
5 26 6 10 3 0 0 5 13 61 61 16 14 13 39 6 9 6 11 13 39 6 10 17 3 30 17
33 3 14 2 3 7 12 18 26 20 40 3 11 3 37 14 14 6 16 58 18 33 13 39 16 2 10 25 43 5
4 26 23 3 53 24 18 27 17 26 4 67 7 12 35 17 12 25 3 27 12 35
16 4 15 7 2 0 3 2 19 0 63 11 21 6 28 1
3 2 10 28 4 12 24 36
1

TABLE 3

MONITORING OF LAND SURFACE OBSERVATIONS
MONTHLY SUSPECT LIST - SYNOPS & AUTOSYNOPS
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for synops & autosynops.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00, 06, 12, 18 UTC
Elements monitored		:Surface pressure (hPa).
Parameters monitored	:HT(m)	:Station height (in metres) as given in WMO No. 9 Vol A
	:RP	:Pressure reporting practice M=mean sea level pressure (hPa) reported. S=Station level pressure reported. 8=Geopotential height (m) of 850 hPa surface reported. 7=Geopotential height (m) of 700 hPa surface reported.
	:NOBS	:Number of observations received excluding duplicates.
	:NGE	:Number of observations with gross errors.
	:PGE	:Percentage of observations with gross errors.
	:%REJ	:Percentage of observations flagged excluding those with gross errors.
	:SD	:SD of difference of observations from background values excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors.
GROSS ERROR LIMIT	:15 hPa	(pressure)
SELECTION CRITERIA	:NOBS	≥ 20 ,and one or more of the following:
	1.|bias|	≥ 4 hPa
	2. SD	≥ 6 hPa
	3.PGE	≥ 25.

N.B. For stn ht ≥ 500m, mslp is that calculated from station level pressure where available.
For stn ht < 500m, mslp is that as reported by the station where available.

WMO REGION 1:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
60010	28.3N	16.5W	2367	S7	80	0	0	48	4.0	-5.1	6.5
60445	36.2N	5.4E	1081	S8	116	0	0	0	0.8	5.0	5.1
60468	35.6N	6.2E	1052	S8	113	112	99	0	0.0	-2.9	2.9
60511	35.3N	1.4E	1127	S8	117	106	91	0	0.3	14.5	14.5
60535	34.7N	3.3E	1144	S8	86	0	0	1	1.1	-6.2	6.3
60670	24.6N	9.5E	1054	S8	100	0	0	0	0.8	9.9	9.9
63330	13.5N	39.5E	2070	MS	33	33	100	0			
63333	11.1N	39.7E	1903	MS	43	1	2	5	1.8	5.3	5.6
63334	10.3N	37.7E	2515	MS	36	0	0	0	0.9	10.2	10.2
63402	7.7N	36.8E	1725	MS	33	0	0	0	0.8	7.5	7.5
63450	9.0N	38.8E	2354	MS	57	1	2	0	0.9	4.7	4.8
63471	9.6N	41.9E	1260	MS	50	1	2	0	0.6	10.9	10.9
63478	5.9N	43.6E	295	MS	40	0	0	0	1.1	6.1	6.2
63602	3.1N	30.9E	1204	S	38	35	92	0	7.0	-7.7	10.4
63680	0.3N	32.6E	1144	S8	24	1	4	96	0.6	-7.4	7.4
68030	18.5S	25.6E	1071	8	39	0	0	0	0.8	4.9	5.0
68038	20.5S	26.0E	903	8	38	0	0	8	0.8	4.5	4.6
68396	26.5S	31.3E	641	S8	56	0	0	0	0.8	4.9	5.0

WMO REGION 2:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
24671	63.9N	135.9E	402	MS	98	3	3	0	4.1	7.1	8.2
24688	63.3N	143.2E	741	MS	119	41	34	0	4.4	4.9	6.6
30320	56.9N	105.7E	669	MS	117	61	52	0	2.8	2.0	3.4
30669	53.1N	117.5E	708	MS	25	0	0	0	1.3	-5.3	5.5
30741	52.8N	110.0E	1286	S8	120	2	2	28	1.8	-4.0	4.4
30967	49.9N	115.8E	623	MS	89	1	1	0	2.7	-5.6	6.2
31474	51.6N	133.3E	384	MS	120	2	2	0	3.4	4.9	6.0
31532	50.9N	132.3E	272	MS	123	2	2	41	3.3	4.5	5.6
40701	39.3N	44.4E	1470	MS	88	0	0	0	1.0	8.2	8.3
40710	37.9N	47.5E	1550	MS	84	0	0	80	3.3	6.8	7.6
40726	36.8N	45.7E	1384	MS	85	1	1	16	1.7	4.1	4.4
40738	36.8N	54.5E	155	MS	75	59	79	0	0.8	13.7	13.7
40741	36.6N	61.2E	235	M	83	0	0	70	1.5	-5.0	5.2
40743	36.2N	57.7E	941	MS	110	0	0	1	1.3	-4.4	4.6
40762	35.3N	59.2E	1333	MS	112	22	20	1	0.5	-14.1	14.1
40763	35.2N	58.5E	1060	MS	40	0	0	0	0.8	-5.5	5.6
40783	32.4N	49.7E	1972	MS	74	1	1	0	1.3	-5.0	5.2
40789	33.8N	55.1E	921	MS	69	0	0	1	1.3	8.8	8.9
40812	32.0N	49.3E	372	MS	78	1	1	73	0.8	4.8	4.9
40836	30.8N	51.7E	1880	MS	60	0	0	0	1.2	8.3	8.4
40859	29.0N	53.7E	1383	MS	67	0	0	0	0.9	9.5	9.5
41254	23.1N	57.7E	1755	S8	87	87	100	0			
41396	16.0N	48.9E	700	MS	27	0	0	0	0.7	7.2	7.2
44239	48.8N	103.6E	1209	S	111	0	0	1	1.2	-4.3	4.5
44256	49.6N	114.4E	706	MS	105	1	1	5	2.1	-4.6	5.1
44416	28.6N	81.6E	720	MS	63	1	2	2	1.8	4.9	5.2
47022	40.8N	128.2E	1200	S	43	0	0	2	1.3	5.2	5.4
51334	44.6N	82.9E	321	M	121	0	0	64	3.1	7.4	8.0
51379	44.0N	89.6E	794	M	121	0	0	60	2.8	7.7	8.2
51495	43.5N	91.6E	874	M	122	37	30	36	2.0	11.9	12.1
51730	40.5N	81.1E	1013	M	122	0	0	5	1.5	4.4	4.6
51818	37.6N	78.3E	1376	M	121	0	0	40	2.8	6.2	6.8
52955	35.6N	100.8E	3201	S	122	6	5	0	0.8	13.5	13.5
53083	44.6N	114.2E	1183	M	122	1	1	80	2.7	6.5	7.0
53352	41.7N	110.4E	1377	M	122	1	1	48	2.8	5.4	6.1

WMO REGION 2:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
53480	41.0N	113.1E	1416	M	121	1	1	24	2.7	4.6	5.3
53588	39.0N	113.5E	2898	S	122	122	100	0			
53705	37.5N	105.7E	1185	M	122	0	0	25	2.2	4.2	4.7
53764	37.5N	111.1E	951	M	121	0	0	7	2.6	4.2	4.9
54386	41.4N	128.2E	1018	M	120	0	0	43	2.3	4.8	5.3
54587	39.1N	123.2E	-98	M	88	0	0	1	1.2	-4.6	4.8
56385	29.5N	103.3E	3049	S	123	0	0	9	2.2	-5.0	5.5
56444	28.5N	98.9E	3488	S	122	122	100	64			
56462	29.0N	101.5E	2994	S	123	0	0	1	1.6	9.2	9.3
57006	34.6N	105.8E	1143	M	121	0	0	0	1.9	5.2	5.5
59007	24.1N	105.1E	1251	M	122	0	0	31	1.5	4.4	4.6

WMO REGION 3:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
80099	7.1N	70.7W	128	MS	53	0	0	0	1.2	-6.9	7.0
82246	2.6S	54.9W	176	MS	88	0	0	3	2.2	4.1	4.7
82704	7.6S	72.7W	170	MS	77	0	0	0	1.4	-4.3	4.5
83214	10.3S	54.9W	285	MS	75	0	0	0	3.2	-5.3	6.2
83235	12.4S	46.4W	604	MS	89	0	0	3	1.5	6.9	7.1
83319	14.7S	52.4W	315	MS	87	0	0	0	0.8	-4.8	4.9
83332	14.1S	46.4W	826	MS	89	16	18	0	0.8	13.6	13.6
83408	14.3S	43.8W	447	MS	88	0	0	0	0.8	11.0	11.0
83423	16.7S	49.3W	741	MS	90	0	0	1	1.4	-4.4	4.6
83488	17.8S	42.9W	1097	MS	88	88	100	0			
83531	18.6S	46.5W	940	MS	60	1	2	0	0.8	-6.2	6.3
83587	19.9S	43.9W	850	MS	88	0	0	1	1.0	-6.5	6.6
83704	22.3S	53.9W	369	MS	65	0	0	100	1.3	-9.5	9.6
83773	23.1S	48.9W	793	MS	43	0	0	0	1.0	-9.4	9.5
83836	25.5S	50.6W	837	MS	90	0	0	0	0.8	-4.7	4.8
83953	30.9S	55.5W	231	MS	90	1	1	0	0.8	-10.5	10.5
84377	3.8S	73.3W	125	MS	87	0	0	0	1.2	4.1	4.3
84401	5.2S	80.6W	49	MS	82	0	0	1	1.3	4.1	4.3
84425	5.9S	76.1W	179	MS	41	0	0	0	1.0	4.9	5.0
84455	6.5S	76.4W	281	MS	59	0	0	0	1.5	6.1	6.3
84472	7.1S	78.5W	2620	S	42	0	0	2	1.4	-5.4	5.6
84474	7.2S	76.7W	350	S	41	0	0	100	1.5	9.4	9.5
84542	9.4S	77.6W	2750	S	35	1	3	11	1.4	4.1	4.3
84686	13.6S	72.0W	3248	S	86	0	0	0	0.8	-4.4	4.5
84688	13.7S	73.4W	3444	S	33	0	0	100	0.6	-8.3	8.3
84720	14.9S	75.0W	567	MS	64	0	0	0	0.8	4.6	4.7
84782	18.1S	70.3W	468	MS	83	0	0	0	1.0	8.1	8.2
85141	14.5S	67.6W	204	MS	52	0	0	0	1.8	4.5	4.8
85230	17.6S	69.6W	4054	S	55	0	0	42	1.8	4.2	4.6
85312	19.8S	63.9W	992	S	43	1	2	0	1.3	-10.8	10.9
85406	18.3S	70.3W	55	M	119	0	0	0	1.0	4.9	5.0
85432	22.5S	68.9W	2320	S8	86	0	0	0	0.8	6.2	6.3

WMO REGION 4:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
70194	66.6N	145.3W	431	S	114	114	100	10			
71434	55.2N	85.1W	10	MS	123	56	46	5	1.3	-4.5	4.7
71492	69.2N	122.4W	552	MS	119	0	0	63	2.0	-5.3	5.7
72376	36.8N	108.2W	1677	M	113	0	0	27	3.6	4.9	6.1
72475	38.4N	113.0W	1536	M	106	0	0	8	3.5	5.0	6.1
76055	31.0N	114.9W	440	MS	40	40	100	0			
76658	19.2N	103.7W	494	MS	40	0	0	0	0.6	6.4	6.4
76750	18.5N	88.3W	9	MS	74	1	1	3	1.5	-8.5	8.6
76773	17.8N	97.8W	1680	MS	32	1	3	0	0.9	8.5	8.5
76775	17.1N	96.7W	1550	MS	61	0	0	0	0.7	4.7	4.8

WMO REGION 4:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
76845	16.7N	92.6W	2276	MS	78	78	100	0			
78718	14.4N	87.6W	626	MS	49	48	98	41	0.0	-8.1	8.1

WMO REGION 5:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
91163	21.9N	159.6W	7	8	357	357	100	0			
92010	6.1S	145.4E	1587	M	40	0	0	0	1.0	10.1	10.1
95611	34.6S	118.5E	107	MS	106	0	0	0	2.2	7.9	8.2
95909	36.5S	148.3E	1957	MS	120	120	100	0			
98433	14.5N	121.4E	614	MS	24	1	4	96	0.6	-4.4	4.4

WMO REGION 6:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
03132	54.9N	5.0W	11	M	350	79	23	13	3.2	4.0	5.1
10557	50.5N	11.1E	845	S8	369	369	100	0			
10954	47.8N	10.9E	540	S8	150	150	100	41			
12140	54.4N	18.7E	2	MS	120	0	0	100	0.9	7.7	7.8
13269	44.3N	19.9E	176	MS	116	2	2	99	2.0	8.1	8.3
13581	41.2N	21.5E	-9999	8	68	1	1	81	1.9	-4.0	4.4
13593	41.3N	22.4E	1031	8	61	0	0	16	1.3	-6.4	6.5
16227	41.9N	13.6E	655	MS	369	239	65	0	1.9	-12.7	12.8
16470	36.8N	12.0E	191	MS	69	0	0	57	1.4	-4.3	4.5
17092	39.8N	39.5E	1218	S8	120	0	0	0	1.4	9.2	9.3
17203	38.9N	40.5E	1177	S8	109	0	0	1	1.0	5.1	5.2

ANTARCTIC:

STATION	LAT	LONG	HT(M)	RP	NOBS	NGE	PGE	%REJ	SD	BIAS	RMS
89108	89.0S	1.0W	2755	M	293	0	0	0	0.8	5.5	5.6
89266	72.2S	60.3W	91	M	244	243	100	0			
89327	73.2S	127.1W	30	S	251	211	84	0	7.2	-1.5	7.4
89612	66.3S	110.8E	390	S	229	229	100	0			
89744	74.0S	43.0E	3353	S	283	0	0	0	0.6	7.7	7.7
89769	78.5S	168.4E	50	S	401	401	100	30			
89805	74.1S	109.8E	3096	S	222	64	29	0	2.3	3.7	4.4
89847	67.6S	146.0E	30	S	319	0	0	0	1.6	-7.8	8.0
89872	78.0S	170.8E	45	S	281	0	0	0	1.0	7.0	7.1

TABLE 4

MONTHLY MONITORING OF AIRCRAFT OBSERVATIONS
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Statistics for each airline carrier.
Area monitored		:90°N - 90°S, 180°W - 180°E.
Standard of comparison		:Background field from UKMO global model.
Observation times		:All hours combined.
Level(s) monitored		:70.0 - 500.0 hPa
Elements monitored		:TEMP in °C ; WIND in m s^{-1}
Parameters monitored		
	:N REP.	:Number of observations received excluding duplicates.
	:PG	:Percentage of observations with gross errors.
	:PR	:Percentage of observations rejected by quality control including rejections from the duplicate check.
	:PC	:Percentage of observations with calm winds.
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors in Temperature & vector wind.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors in Temperature & Wind Speed.
GROSS ERROR LIMITS		:10.0 °C ; 60 m s^{-1} Vector Wind
SELECTION CRITERIA		:N REP ≥ 20

NB : All American ACARS data are grouped together and statistics are shown at the bottom of the table as "US ACARS". All ADS reports are similarly grouped together.

		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
AAA	55	0	35	1.6	0.7	55	0	35	0	6.5	2.4
AAH	114	0	15	1.6	0.0	116	0	16	0	9.2	2.5
AAL	5783	1	15	1.7	0.2	5771	0	16	0	8.8	1.1
AAR	1687	1	7	1.9	-0.4	1680	0	7	0	9.0	0.3
ABB	28	4	4	2.0	0.8	28	0	0	0	8.0	0.7
ACA	1877	0	4	1.9	0.0	1922	0	4	0	7.4	0.6
ACI	69	12	57	1.9	-0.1	59	0	49	0	11.8	1.8
AEA	540	1	5	2.0	0.7	518	0	6	0	9.4	0.9
AEL	674	0	100	1.9	-0.9	665	0	10	0	8.9	0.8
AEY	144	0	2	1.7	0.5	145	1	3	0	7.1	0.8
AFL	442	1	4	1.9	0.4	437	0	3	0	7.3	1.0
AFR	1988	1	9	1.8	0.2	1990	0	9	0	8.3	1.0
AIH	385	1	4	1.9	0.1	386	0	4	0	8.5	0.8
AJM	169	0	3	1.6	-0.2	170	1	6	0	10.0	0.9
AMM	116	4	9	2.0	1.0	115	0	7	0	7.6	0.8
AMT	697	0	100	1.6	0.8	703	0	41	0	8.3	1.6
AMX	337	2	7	2.2	0.4	334	0	7	0	11.5	-0.3
ANA	1503	0	7	1.8	-0.3	1497	1	9	0	9.5	0.5
ANO	32	0	6	0.7	0.2	32	0	6	0	5.0	0.9
ANZ	4495	1	46	1.7	0.1	4434	0	46	0	8.0	1.1
AOM	1092	1	8	1.8	0.6	1104	0	9	0	8.3	1.0
ARG	90	2	38	2.9	1.0	92	0	35	0	9.0	2.0
ATN	152	1	41	3.7	3.3	152	0	59	0	17.4	5.9
AUA	21	0	0	1.3	0.9	21	0	5	0	11.4	0.1
AVA	648	0	3	1.9	0.5	646	0	5	0	10.0	0.8
AVE	190	0	4	1.8	0.7	189	0	6	0	10.6	1.0
AVN	107	3	37	1.3	0.6	103	0	36	0	7.9	0.7
AXF	69	19	48	1.0	0.3	58	0	36	0	8.0	3.6
AZA	565	1	100	2.4	0.8	572	0	6	0	8.4	0.2
BAL	448	1	9	1.7	-0.1	448	0	8	0	7.8	1.3
BAW	1604	0	7	1.9	-0.1	1608	0	7	0	8.0	1.1
BBB	65	2	3	1.5	-0.1	63	0	5	0	9.7	0.1
BLX	73	0	4	1.6	0.0	72	1	6	0	8.0	2.6
BWA	405	1	6	2.0	1.1	404	0	7	0	10.6	1.2
CAL	546	0	4	1.6	0.2	553	0	6	0	9.3	0.2
CCA	221	4	17	2.6	0.3	246	1	100	0	15.1	0.0
CDN	2269	1	7	1.9	0.0	2277	0	8	0	8.7	0.6
CES	305	0	7	2.0	0.4	321	2	12	0	11.8	-0.4
CFC	32	9	9	1.9	1.5	33	0	9	0	13.4	2.5
CFG	1683	1	3	1.7	-0.7	1683	0	4	0	8.2	0.9
CKS	570	1	40	1.8	1.0	577	0	40	0	7.9	1.2
CKT	200	1	7	2.2	1.7	190	1	7	0	7.6	0.8
CLX	392	1	5	1.6	-0.4	388	0	4	0	7.8	0.8
CMI	485	0	4	1.6	0.7	512	0	4	0	10.4	1.1
CMM	408	0	22	2.1	0.3	403	0	21	0	8.0	0.9
COA	1501	0	21	1.7	0.2	1507	0	24	0	11.0	1.6
CPA	78	3	18	1.8	0.7	84	0	17	0	7.2	1.6
CRL	763	1	8	1.7	0.9	768	1	8	0	8.5	1.3
CSN	125	2	10	2.4	0.9	127	0	8	0	9.6	0.8
CTB	225	0	7	1.4	-0.4	227	0	8	0	7.7	1.4
CTM	55	4	33	2.3	-0.7	55	0	29	0	10.3	3.0
CUB	431	1	6	2.3	1.4	424	0	8	0	10.8	0.1
DAL	3846	1	29	1.7	0.5	3875	0	30	0	8.5	1.0
DBY	669	0	3	1.5	-0.5	663	0	5	0	9.0	0.8
DLH	2465	0	6	1.8	-0.2	2439	0	7	0	8.0	0.9
EEZ	139	6	42	5.4	4.1	132	1	12	0	8.2	1.3
EIA	312	0	35	1.6	0.7	299	0	37	0	8.0	0.9
ELY	126	0	4	1.8	-0.2	133	0	5	0	8.4	1.6
ETH	34	0	15	1.4	0.3	38	0	16	0	7.2	1.8

		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
EVA	1974	0	6	1.7	-0.2	2008	0	7	0	8.6	0.3
EWW	122	0	4	1.6	0.4	129	0	7	0	8.6	2.2
FDX	1672	0	17	1.7	0.5	1676	0	18	0	9.0	1.0
FIN	439	0	3	1.6	0.2	432	0	3	0	7.4	0.6
FJI	1043	11	45	2.0	0.7	918	0	38	0	9.5	0.7
FOM	334	18	50	1.8	0.5	284	0	42	0	9.2	0.7
FWQ	40	0	58	1.9	0.0	40	0	55	0	7.5	-0.5
GAF	21	0	0	1.2	-0.6	21	0	0	0	5.5	-0.5
GCO	57	2	11	1.6	0.5	66	0	17	0	13.7	4.2
GHA	69	0	3	1.9	0.1	71	0	3	0	11.4	1.7
GIA	22	0	9	1.7	1.2	22	0	14	0	8.4	-1.0
GRL	47	0	0	1.4	-0.2	47	0	0	0	5.3	0.6
GTI	291	0	14	2.3	0.3	298	1	14	0	9.1	0.4
HAL	3784	1	35	1.6	0.4	3743	0	36	0	9.8	1.6
HLF	88	0	3	2.4	-0.5	86	0	3	0	8.3	1.8
HLQ	34	0	29	2.0	1.1	36	0	28	0	6.3	0.0
HRH	370	21	76	1.3	0.1	307	0	70	0	9.7	1.4
HVN	25	0	4	2.1	1.1	25	0	0	0	6.9	0.5
IBE	2733	1	8	2.0	0.6	2712	0	8	0	9.3	0.7
ICE	1228	0	3	1.7	0.0	1215	0	3	0	7.5	0.8
IWD	173	1	2	1.3	-0.5	172	0	2	0	8.6	0.6
JAA	63	0	3	2.1	1.5	63	3	6	0	6.6	2.2
JAL	7436	0	4	1.8	0.3	7397	0	5	0	8.4	0.8
JAZ	371	0	4	1.5	0.8	370	0	5	0	8.4	0.8
JKK	273	1	9	2.0	-0.3	246	0	8	0	8.2	0.5
KAL	3760	1	10	1.9	-0.2	3739	0	11	0	9.4	0.5
KLM	2786	0	11	2.0	0.5	2814	0	9	0	7.8	0.7
LAN	42	5	17	3.5	1.0	43	0	14	0	10.0	2.2
LAP	61	3	34	2.0	0.9	60	0	37	0	12.8	3.8
LDA	179	1	7	1.6	-0.4	173	1	9	0	8.0	1.1
LDI	680	0	100	2.8	0.0	676	0	8	0	7.9	0.6
LIB	390	2	4	1.6	0.8	387	0	3	0	9.2	0.9
LOT	136	0	4	1.8	-1.1	135	0	6	0	7.8	0.8
LPR	25	0	16	2.6	1.0	25	0	12	0	8.3	2.6
LTU	769	2	5	1.6	-0.1	763	0	5	0	8.7	1.1
MAS	539	1	9	1.8	0.5	552	0	10	0	9.4	0.6
MDA	22	0	0	1.5	-0.1	21	5	10	0	9.6	-2.8
MMZ	31	0	6	2.8	0.5	31	0	0	0	7.7	1.4
MON	90	1	2	1.9	-0.5	89	0	0	0	7.1	1.6
MPD	271	1	4	1.9	0.5	271	0	5	0	9.9	1.1
MPH	889	0	3	1.8	-0.7	884	0	4	0	7.8	0.4
NCA	716	0	4	1.8	0.2	706	1	6	0	8.4	0.2
NVR	45	4	9	2.0	0.7	45	0	9	0	9.6	-0.7
NWA	10369	0	11	1.8	0.5	10252	0	11	0	8.4	0.7
OAL	38	0	3	0.9	-0.3	41	0	2	0	5.5	0.0
PAC	329	2	100	1.4	0.4	331	0	36	0	8.6	0.8
PAL	1450	0	13	1.7	-0.2	1364	0	15	0	9.1	0.9
PAO	494	15	66	1.8	0.2	422	0	59	0	7.8	1.6
PIA	21	0	0	2.5	-0.1	23	0	0	0	6.6	-0.4
QFA	2094	1	57	1.6	0.2	2073	0	56	0	8.1	0.9
RAF	99	0	2	1.8	0.9	99	0	2	0	9.4	1.5
RAM	43	5	9	2.3	-0.5	43	0	12	0	13.6	-2.4
RCH	367	1	16	2.5	0.7	343	1	18	0	10.8	2.7
RJA	20	0	5	1.7	-0.1	21	0	5	0	7.8	1.4
RKA	106	0	4	1.8	-0.3	106	0	8	0	11.6	0.1
RRR	69	1	9	2.2	-0.3	69	0	6	0	8.0	1.4
RYN	470	2	43	1.5	1.0	470	0	41	0	7.0	0.8
RZO	95	3	4	1.4	0.0	94	0	2	0	7.6	0.8
SAA	292	1	7	1.7	-0.2	282	0	8	0	9.9	1.0

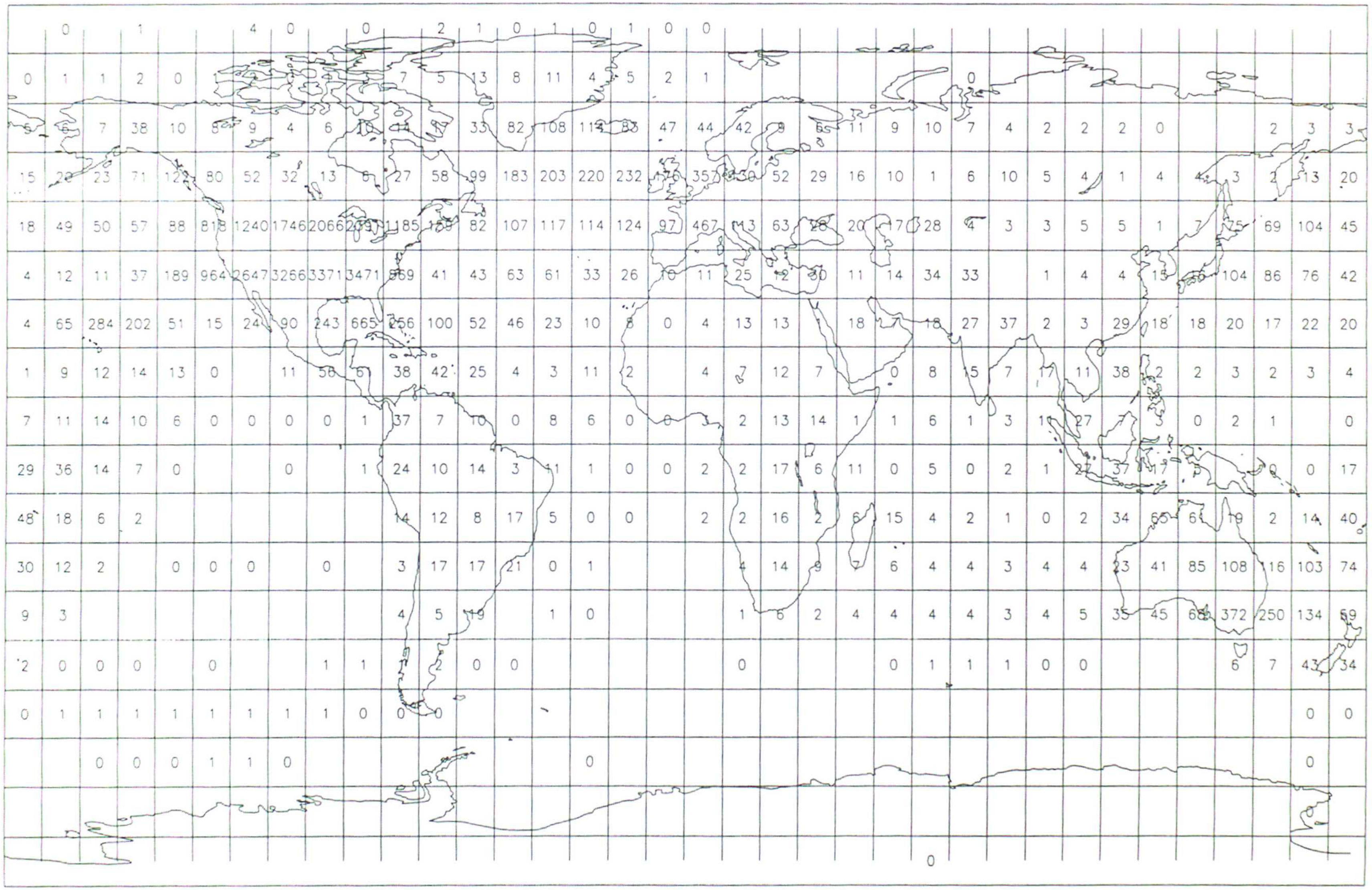
		TEMPERATURE						WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
SAB	60	2	12	2.4	0.5	61	0	8	0	9.0	1.6
SAS	1557	0	18	1.6	-0.3	1554	0	18	0	7.0	0.5
SIA	575	1	6	1.8	0.1	568	0	7	0	9.0	0.0
SKX	178	0	68	1.3	-0.2	178	0	68	0	5.3	0.6
SLR	219	0	10	1.7	-1.1	218	1	11	0	6.9	0.5
SNB	79	13	30	4.1	2.8	79	0	8	0	8.0	0.8
SOL	53	0	4	1.3	0.8	47	0	6	0	7.8	1.3
SVA	125	0	6	2.0	-0.1	129	0	7	0	8.7	0.9
SWR	61	3	7	1.7	0.5	64	0	8	0	11.5	2.4
TAP	548	2	5	1.7	0.0	542	1	8	0	10.2	0.5
TCU	46	0	7	1.7	-1.0	47	0	6	0	6.3	-0.4
THA	357	2	7	1.9	-0.4	355	0	7	0	9.2	0.1
THT	122	0	33	2.1	0.5	122	0	32	0	8.3	2.1
TOW	169	1	5	2.1	0.8	171	2	11	0	11.9	1.2
TPA	22	9	9	1.9	1.2	22	0	0	0	8.1	-0.1
TSC	29	0	0	1.7	1.1	30	3	7	0	11.2	-0.7
TWA	1618	0	11	2.1	0.2	1553	0	11	0	8.6	1.2
UAL	87139	0	86	1.4	-0.1	87016	0	86	0	7.1	0.9
UPS	1440	0	19	1.9	0.6	1436	0	19	0	7.9	0.6
USA	352	1	2	1.6	-0.2	283	0	3	0	8.3	0.4
VIR	701	1	3	1.7	-0.2	706	0	4	0	8.9	1.3
VKG	50	0	6	2.3	-0.2	51	0	4	0	8.2	0.4
VPB	21	0	24	2.5	0.0	21	0	19	0	6.3	1.8
VRG	132	1	20	1.9	0.7	127	0	19	0	8.7	1.2
VSP	38	0	13	1.4	0.8	38	0	16	0	8.7	1.0
VVR	72	0	26	2.6	1.2	83	0	29	0	8.4	0.0
WOA	156	0	6	1.5	0.5	177	0	8	0	8.4	1.7
AN	22630	0	20	1.5	0.4	22630	0	20	0	6.2	0.9
AR	4315	1	100	2.9	2.5	4265	0	5	0	7.2	2.1
BA	11245	0	8	1.5	0.5	11120	0	8	0	6.7	1.0
EU	41808	0	22	1.4	-0.1	41808	0	22	0	6.6	0.8
KL	7557	0	10	1.5	0.7	7516	0	10	0	7.0	1.3
LH	2864	0	8	1.8	1.2	2845	0	7	0	6.4	1.3
MK	5145	0	45	1.7	1.3	5112	0	6	0	7.5	1.7
NZ	3155	0	8	1.3	0.0	3154	0	8	0	6.2	0.5
QF	26965	0	13	1.4	0.6	26990	0	13	0	6.1	0.8
SA	3615	0	62	2.3	1.9	3612	0	8	0	9.8	2.1
SV	1136	0	100	1.8	1.4	1116	0	3	0	6.6	1.2
WA	409	9	16	1.8	0.5	396	5	100	0	14.3	-2.5
XX	4202	1	7	1.7	0.4	4852	0	10	0	12.1	1.0
N	748	1	27	2.5	0.7	777	0	26	0	8.8	1.2
US ACARS	552893	0	49	1.5	0.4	552570	0	49	0	7.0	1.1

MEAN DAILY COUNT OF AIRCRAFT 70 - 500 HPA

FIGURE 3

DECEMBER 1999

OBSERVATIONS WITH O-B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED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15 20 23 71 122 80 52 32 13 6 27 58 99 183 203 220 232 176 357 130 52 29 16 10 1 6 10 5 4 1 4 4 3 2 13 20
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4 65 284 202 51 15 24 90 243 665 256 100 52 46 23 10 8 0 4 13 13 1 18 7 18 27 37 2 3 29 18 18 20 17 22 20
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7 11 14 10 6 0 0 0 0 1 37 7 10 0 8 6 0 0 3 2 13 14 1 1 6 1 3 11 27 7 3 0 2 1 0
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30 12 2 0 0 0 0 3 17 17 21 0 1 4 14 9 7 6 4 4 3 4 4 23 41 85 108 116 103 74
9 3 4 5 19 1 0 1 6 2 4 4 4 4 3 4 5 35 45 68 372 250 134 59
2 0 0 0 0 1 1 1 2 0 0 0 0 1 1 1 0 0 6 7 43 34
0 1 1 1 1 1 1 1 1 0 0 0 0 0
0 0 0 1 1 0 0 0
0

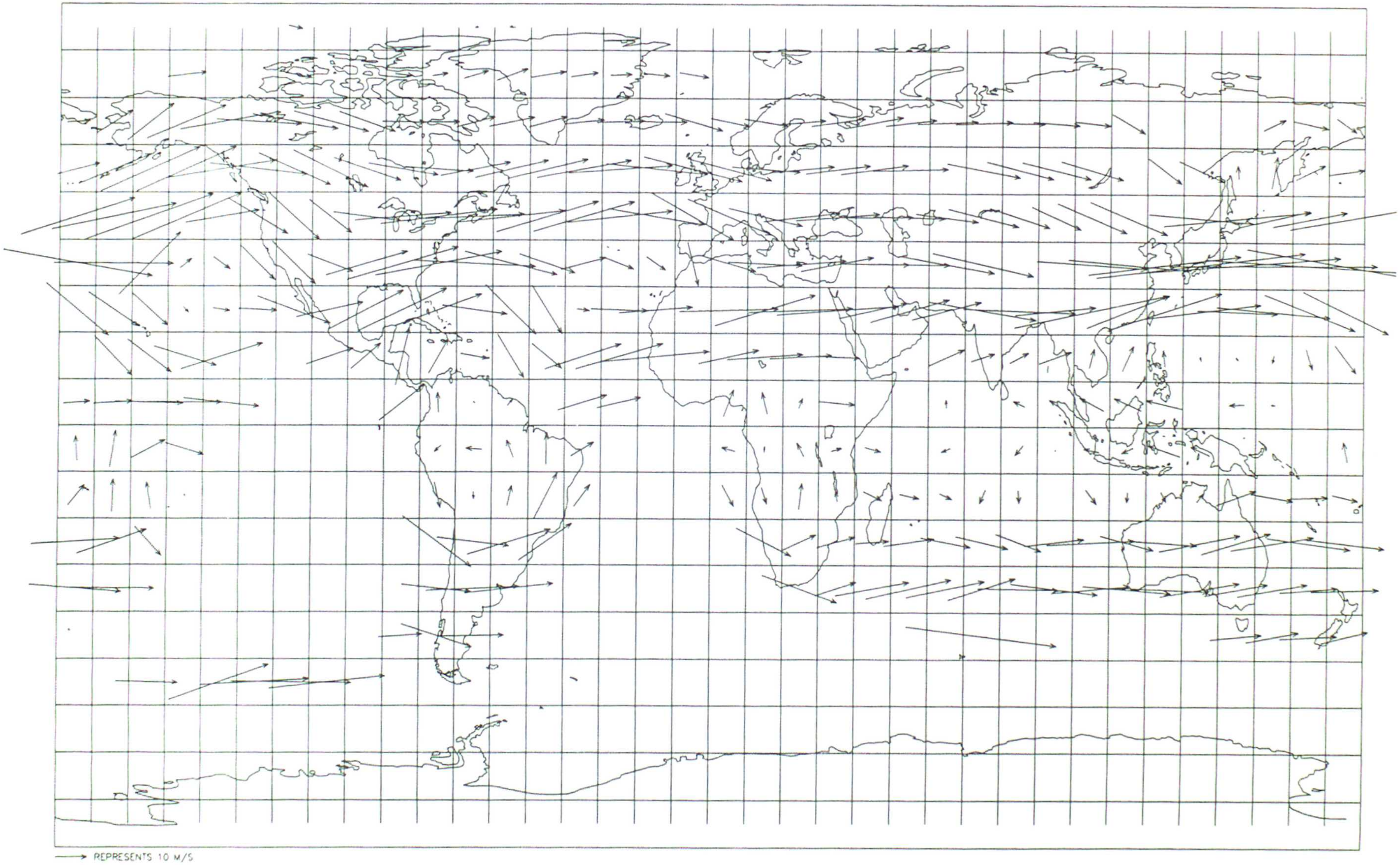
AIRCRAFT MEAN WINDS BETWEEN 70 AND 500 HPA

FIGURE 4

DECEMBER 1999

OBSERVATIONS WITH O–B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED

VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT



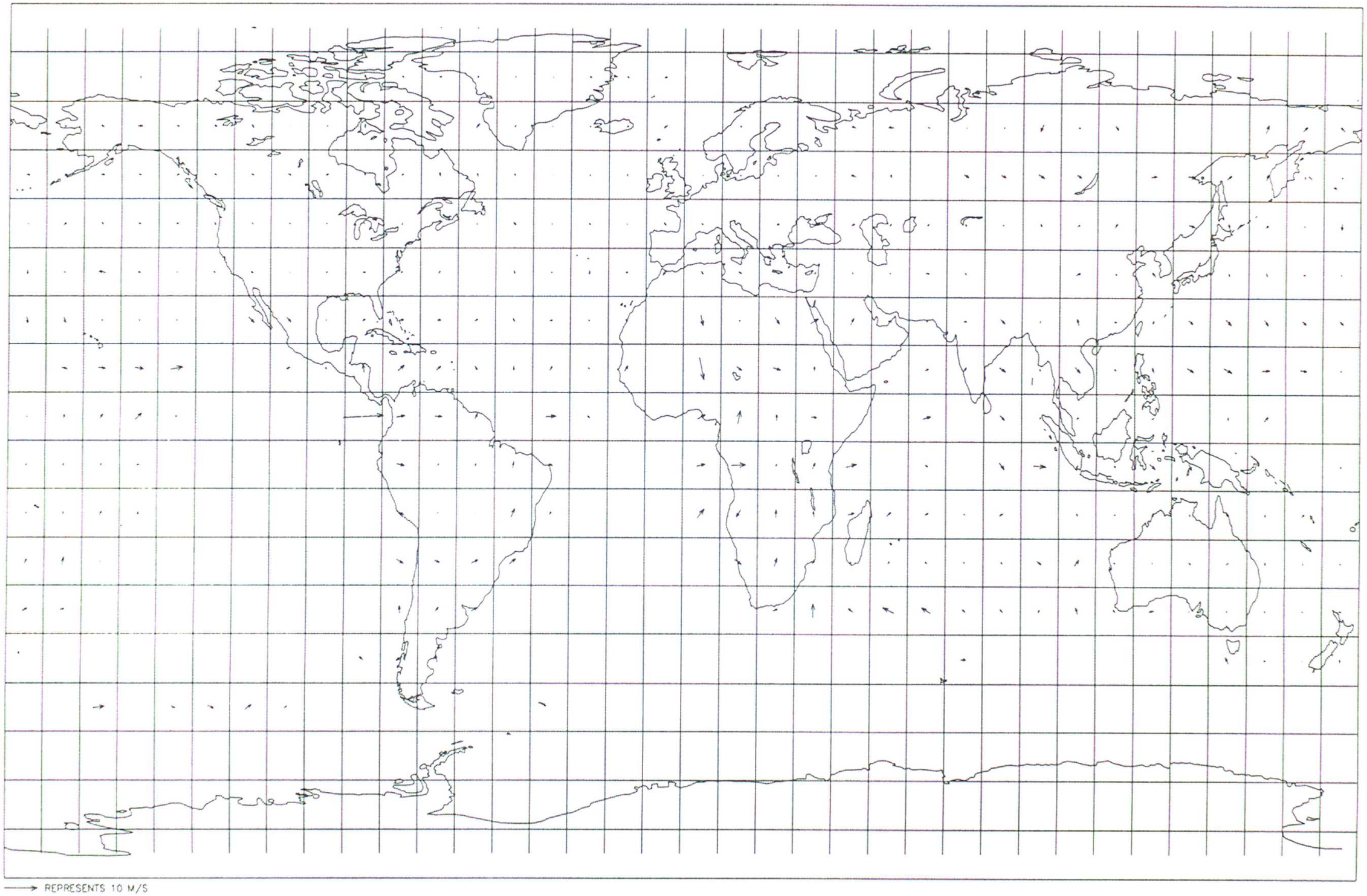
AIRCRAFT MEAN O–B WINDS BETWEEN 70 AND 500 HPA

FIGURE 5

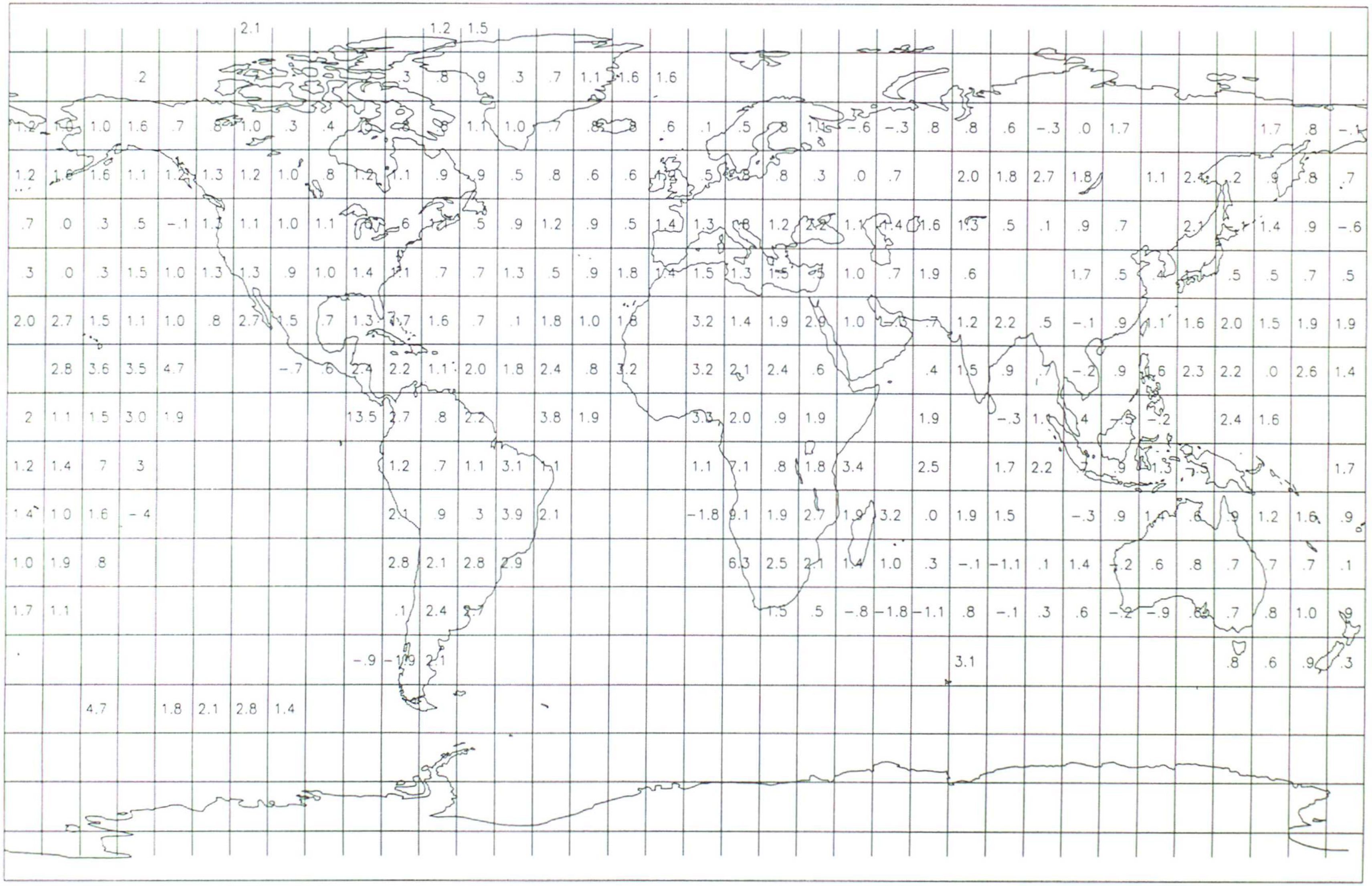
DECEMBER 1999

OBSERVATIONS WITH O–B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED

VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT



AIRCRAFT : MEAN O-B SPEEDS (M/S) BETWEEN 70 AND 500 HPA FIGURE 6
DECEMBER 1999
OBSERVATIONS WITH O-B VECTOR DIFFERENCE > 60 MPS EXCLUDED
VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT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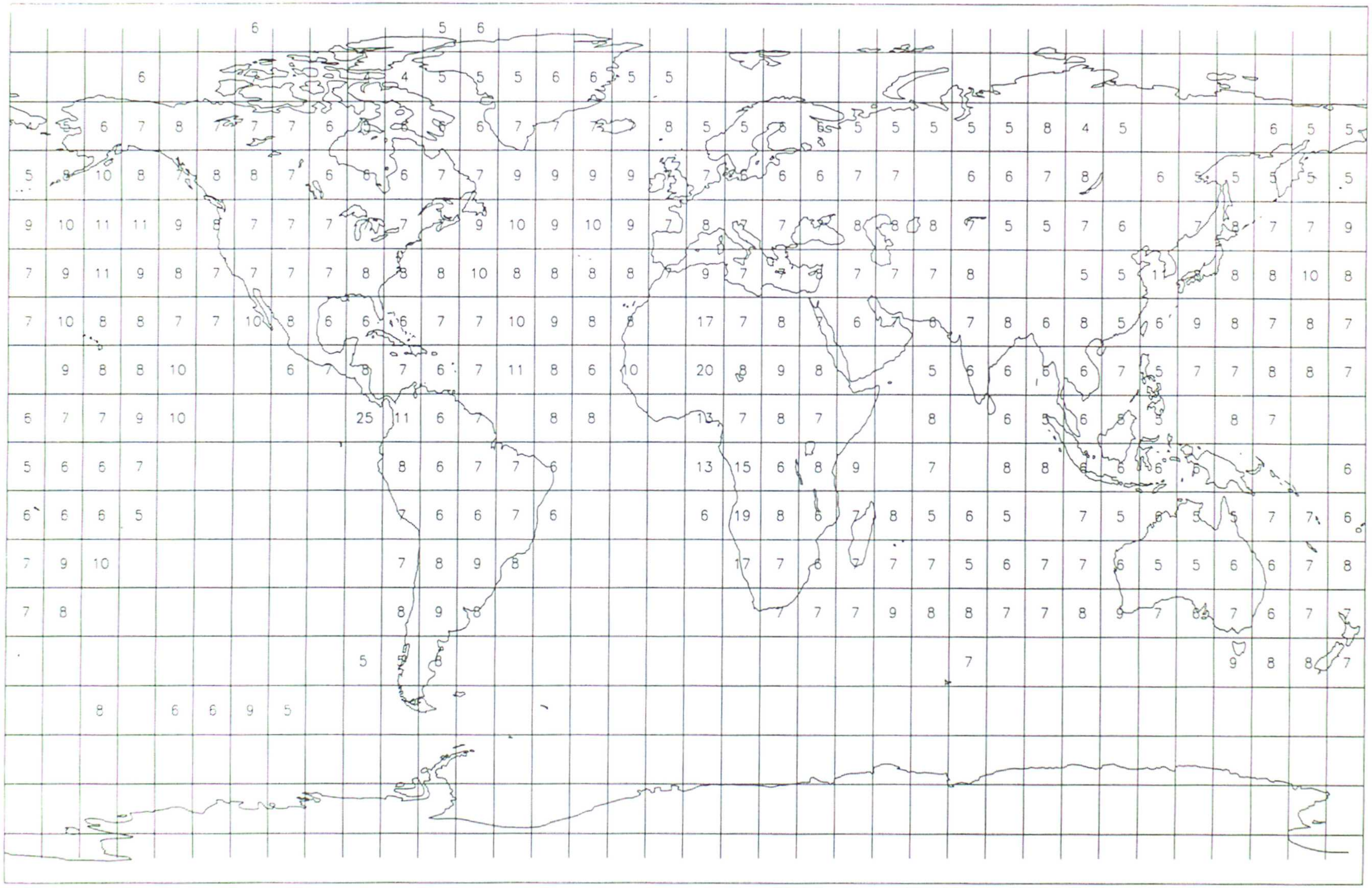
1.2 1.6 1.6 1.1 1.2 1.3 1.2 1.0 .8 1.2 1.1 .9 .9 .5 .8 .6 .6 1.5 .5 .8 .8 .3 .0 .7 2.0 1.8 2.7 1.8 1.1 2.4 .2 .9 .8 .7
.7 0 .3 .5 -.1 1.3 1.1 1.0 1.1 .6 .6 .5 .9 1.2 .9 .5 1.4 1.3 .8 1.2 2.2 1.1 1.4 1.6 1.3 .5 .1 .9 .7 2.1 1.4 .9 -.6
.3 0 .3 1.5 1.0 1.3 1.3 .9 1.0 1.4 1.1 .7 .7 1.3 .5 .9 1.8 1.4 1.5 1.3 1.5 .5 1.0 .7 1.9 .6 1.7 .5 .4 .5 .5 .7 .5
2.0 2.7 1.5 1.1 1.0 .8 2.7 1.5 .7 1.3 1.7 1.6 .7 .1 1.8 1.0 1.8 3.2 1.4 1.9 2.9 1.0 1.5 .7 1.2 2.2 .5 -.1 .9 1.1 1.6 2.0 1.5 1.9 1.9
2.8 3.6 3.5 4.7 -.7 .6 2.4 2.2 1.1 2.0 1.8 2.4 .8 3.2 3.2 2.1 2.4 .6 .4 1.5 .9 .7 -.2 .9 .6 2.3 2.2 .0 2.6 1.4
.2 1.1 1.5 3.0 1.9 13.5 2.7 .8 2.2 3.8 1.9 3.3 2.0 .9 1.9 1.9 -.3 1.1 .4 .5 -.2 2.4 1.6
1.2 1.4 .7 .3 1.2 .7 1.1 3.1 1.1 1.1 .1 .8 1.8 3.4 2.5 1.7 2.2 .7 .9 1.3 .5 1.7
1.4 1.0 1.6 -.4 2.1 .9 .3 3.9 2.1 -1.8 .1 1.9 2.7 1.9 3.2 .0 1.9 1.5 -.3 .9 1.4 .6 .9 1.2 1.6 .9
1.0 1.9 .8 2.8 2.1 2.8 2.9 6.3 2.5 2.1 1.4 1.0 .3 -.1 -1.1 .1 1.4 .2 .6 .8 .7 .7 .7 .1
1.7 1.1 .1 2.4 2.7 1.5 .5 -.8 -1.8 -1.1 .8 -.1 .3 .6 -.2 -.9 .6 .7 .8 1.0 .9
-.9 -1.9 2.1 3.1 .8 .6 .9 .3
4.7 1.8 2.1 2.8 1.4

AIRCRAFT : RMS O-B VECTOR (M/S) BETWEEN 70 AND 500 HPA FIGURE 7
DECEMBER 1999
OBSERVATIONS WITH O-B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED
VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT



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7 9 11 9 8 7 7 7 7 8 8 8 10 8 8 8 8 7 9 7 7 8 7 7 7 8 5 5 11 8 8 10 8
7 10 8 8 7 7 10 8 6 6 6 7 7 10 9 8 8 17 7 8 7 6 6 7 8 6 8 5 6 9 8 7 8 7
9 8 8 10 6 7 8 7 6 7 11 8 6 10 20 8 9 8 5 6 6 6 7 5 7 7 8 8 7
6 7 7 9 10 25 11 6 7 8 8 13 7 8 7 8 6 5 6 8 5 8 7
5 6 6 7 8 6 7 7 6 13 15 6 8 9 7 8 8 6 6 6 6
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7 9 10 7 8 9 8 17 7 6 7 7 7 5 6 7 7 6 5 5 6 6 7 8
7 8 8 9 8 7 7 7 9 8 8 7 7 8 9 7 6 7 6 7 7
5 8 7 9 8 8 7
8 6 6 9 5

TABLE 5

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for radiosonde TEMPs.
Area monitored		:90°N - 90°S, 180°W - 180°E.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00 UTC and 12 UTC.
Level(s) monitored		:Standard levels between 1000.0 - 30.0 hPa
Element monitored		:GEOPOTENTIAL HEIGHT IN metres
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown duringperiod.
	:% REJ	:Percentage of observations rejected by quality control at level shown during period excluding those with gross errors.
	:SD	:SD of difference of observations from background values at level shown excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.
	:NUM LEVELS	:Number of levels satisfying selection criteria.
GROSS ERROR LIMITS	:Defined in Appendix I.1	
SELECTION CRITERIA	: ≥3 levels with ≥10 observations and ≥ 100 m weighted RMS.	

ONLY THE WORST LEVEL IS SHOWN WITH UNWEIGHTED RMS

WMO IDENT	OBS TIME	ELM	LEV	LAT/LONG	NUM OBS	NUM GROSS	SD	BIAS	RMS	NUM LEVELS
33317	00	Z	200	50/ 27	25	0	33.8	82.7	89.3	5
34731	00	Z	200	47/ 40	15	0	41.0	-72.6	83.4	4
42361	00	Z	150	26/ 78	15	0	100.3	14.6	101.3	4
43003	12	Z	150	19/ 73	14	7	62.8	195.3	205.1	7
43014	12	Z	100	20/ 75	9	1	60.3	146.2	158.2	6
43192	00	Z	150	15/ 74	11	0	87.8	-73.5	114.5	4
43353	12	Z	100	10/ 76	14	0	109.4	38.3	115.9	5
43369	00	Z	100	8/ 73	27	0	79.8	-149.3	169.3	6
43371	12	Z	150	8/ 77	11	0	75.4	135.7	155.3	4
44292	00	Z	1000	48/ 107	27	2	25.6	50.1	56.2	4
56739	12	Z	1000	25/ 98	31	0	11.6	63.2	64.3	5
69679	12	Z	1000	44/ 18	19	4	27.5	37.0	46.1	4
72376	00	Z	1000	37/-108	27	3	33.3	44.3	55.4	6
72376	12	Z	1000	37/-108	31	0	37.0	39.6	54.2	5

AVAILABILITY – TEMP – 500 HPA GEOPOTENTIAL – DECEMBER 1999 FIGURE 8
ALL HOURS
10 DEGREE BOX AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS
GLOBAL AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS – 1070

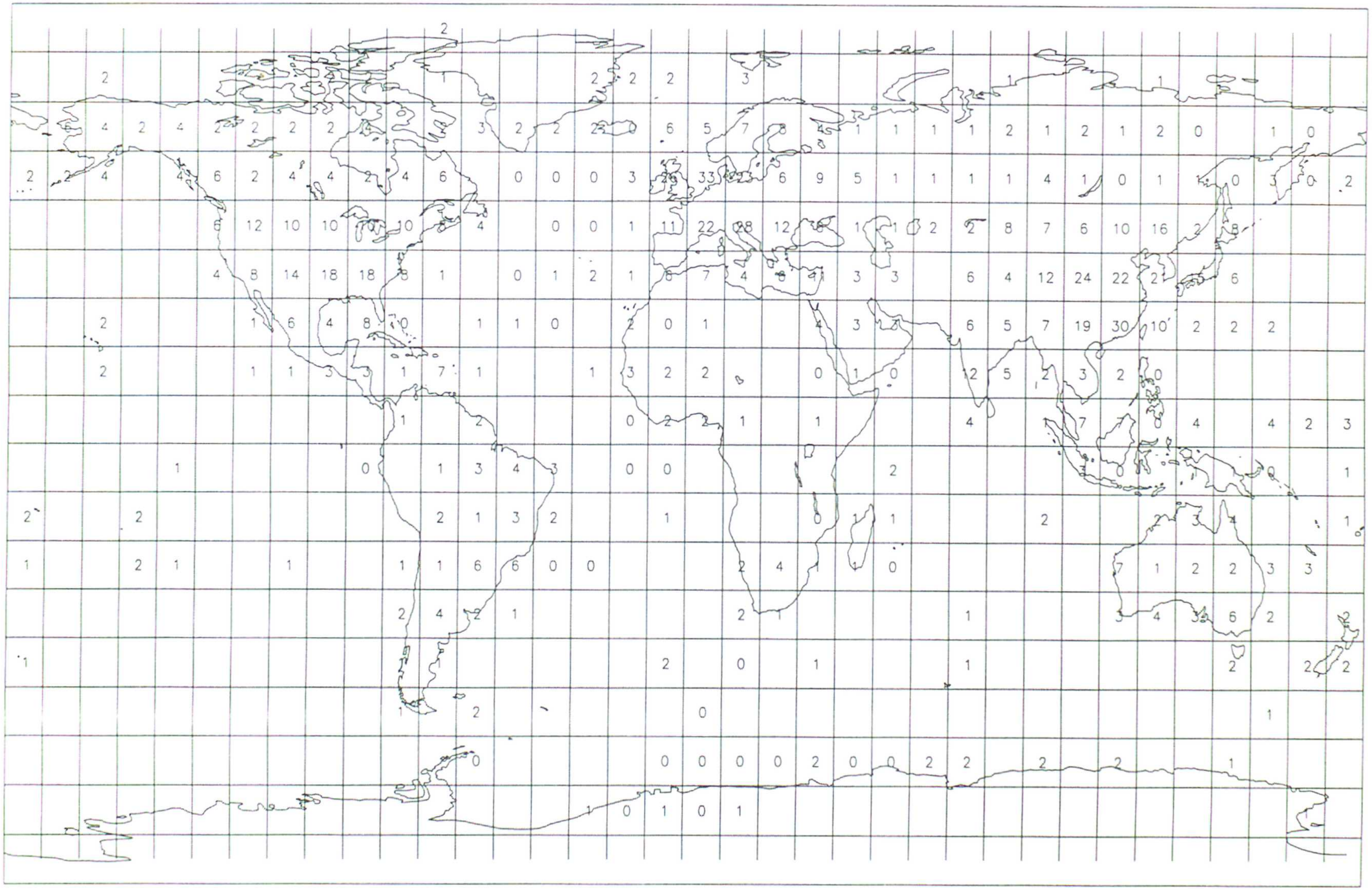


TABLE 6

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from each unique identifier for radiosonde TEMPs.

Area monitored :90°N - 90°S, 180°W - 180°E.

Standard of comparison :Background field from UKMO global model.

Observation times :00 UTC and 12 UTC.

Level(s) monitored :Standard levels between 1000.0 - 100.0 hPa

Element monitored :VECTOR WIND in m s^{-1}

Parameters monitored

:NUM OBS :Number of observations available at level shown during period.

:NUM GROSS :Number of gross errors at level shown during period.

:% REJ :Percentage of observations rejected by quality control at level shown during period excluding those with gross errors.

:UBIAS,VBIAS :Mean difference of observations of U and V components from background values at level shown excluding those with gross errors.

:RMS :Root Mean Square difference of observations from background values at level shown excluding those with gross errors.

:NUM LEVELS :Number of levels satisfying selection criteria.

GROSS ERROR LIMITS :Defined in Appendix I.2

SELECTION CRITERIA : ≥ 10 observations and ≥ 15 m s^{-1} RMS vector wind.

ONLY THE STANDARD LEVEL BETWEEN 1000 - 100 hPa WITH HIGHEST RMS IS SHOWN

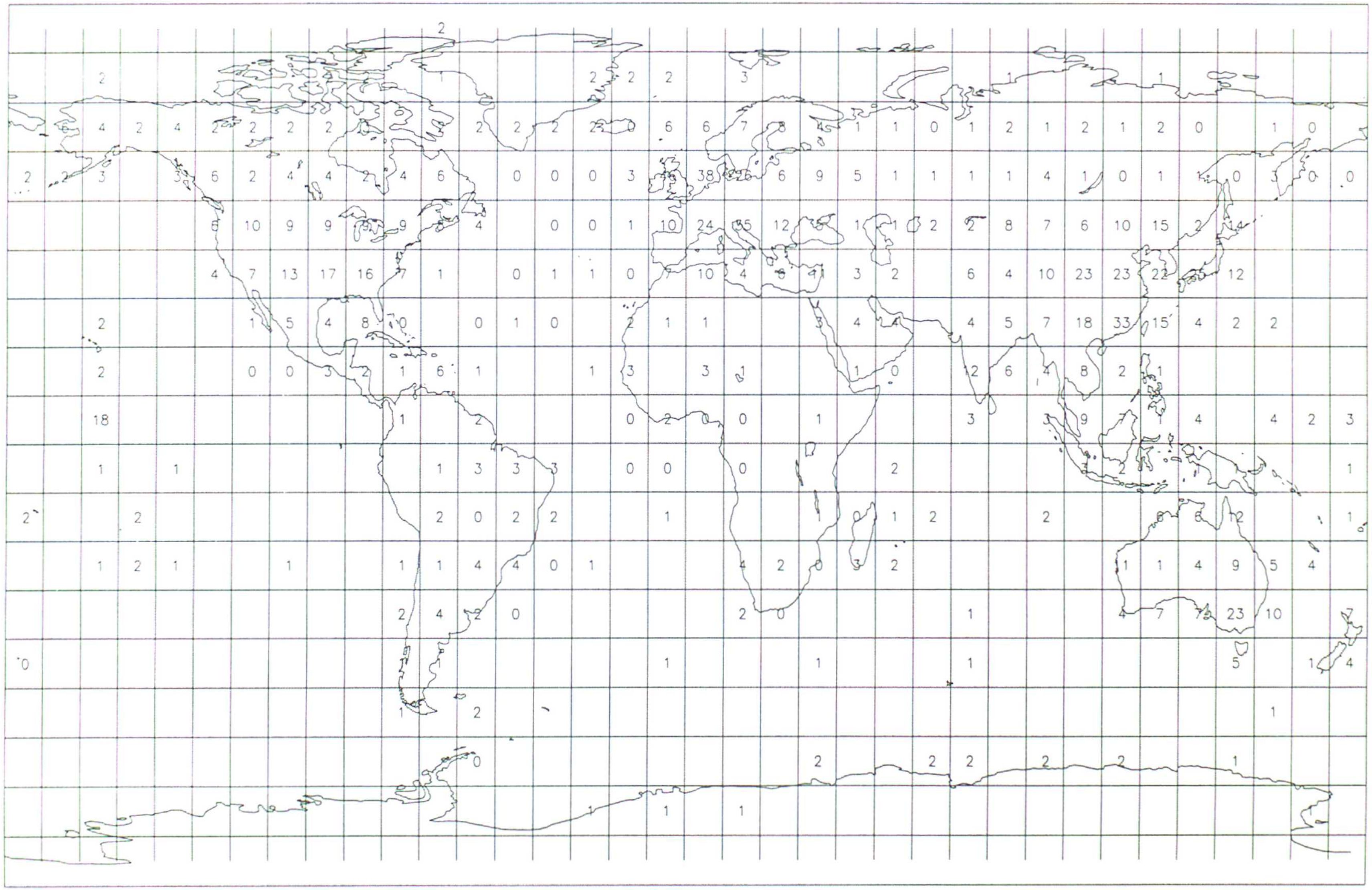
WMO IDENT	OBS TIME	ELM	LEV	LAT/LONG	NUM OBS	NUM GROSS	% REJ	UBIAS	VBIAS	RMS	LEVELS
42361	00	V	250	26/ 78	13	0	100	12.8	9.0	18.5	1
42369	00	V	300	27/ 81	14	0	7	-11.9	4.4	15.6	1
42410	00	V	250	26/ 92	15	1	31	15.9	-0.1	25.9	3
42410	12	V	250	26/ 92	13	0	23	-2.2	-0.2	24.4	2
60620	12	V	250	28/ 0	13	0	23	-15.8	-6.0	18.5	2
68512	12	V	250	-30/ 18	16	0	25	-10.7	5.0	20.0	4

AVAILABILITY – TEMP/PILOT – 300 HPA WIND – DECEMBER 1999 FIGURE 9

ALL HOURS

10 DEGREE BOX AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS

GLOBAL AVERAGE NUMBER OF OBSERVATIONS IN 24 HOURS – 1210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6 10 9 9 9 4 0 0 1 10 24 35 12 1 1 2 2 8 7 6 10 15 2 14
4 7 13 17 16 7 1 0 1 1 0 7 10 4 8 41 3 2 6 4 10 23 23 22 12
2 1 5 4 8 0 0 1 0 2 1 1 3 4 4 4 5 7 18 33 15 4 2 2
2 0 0 3 2 1 6 1 1 3 3 1 1 0 12 6 4 8 2 1
18 1 2 0 2 0 0 1 3 3 9 7 4 4 2 3
1 1 1 3 3 3 0 0 0 2 3 2 1
2 2 2 0 2 2 1 1 0 1 2 2 8 6 12 1 1
1 2 1 1 1 1 4 4 0 1 4 2 0 3 2 1 1 4 9 5 4
2 4 2 0 2 0 1 4 7 7 23 10 7
0 1 1 1 1 5 1 4
1 2 1
0 2 2 2 2 2 1
1 1 1 1 1

TABLE 7

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from each unique identifier for radiosonde TEMPs.
Area monitored		:90°N - 90°S, 180°W - 180°E.
Standard of comparison		:Background field from UKMO global model.
Observation times		:00 UTC and 12 UTC.
Level(s) monitored		:Standard levels between 500.0 - 150.0 hPa
Element monitored		:WIND DIRECTION in degrees
Parameters monitored		
	:NUM OBS	:Average number of observations at all levels.
	:BIAS	:Mean difference of observations from background values from all levels.
	:MAX SPREAD	:(For observation - background values) Maximum absolute difference of SD at any level from SD at all levels
	:SD	:SD of difference of observations from background values at all levels.

SELECTION CRITERIA

:NUM OBS ≥ 5, and
ABSOLUTE BIAS ≥ 10°, with
SD < 30°, and
MAX SPREAD < 10°

WMO IDENT	OBS TIME	ELM	LAT/LONG	NUM OBS	BIAS	MAX SPREAD	SD
17280	00	DD	38/ 40	18	-12.0	5.0	11.1
17351	00	DD	37/ 35	28	-10.4	4.5	12.5
17351	12	DD	37/ 35	26	-13.0	4.0	13.4
42027	12	DD	34/ 75	5	-16.6	10.0	10.0
42361	00	DD	26/ 78	12	-13.7	6.4	6.4
42361	12	DD	26/ 78	8	-11.3	7.3	7.3
43285	00	DD	13/ 75	19	12.3	9.6	21.1
60360	12	DD	37/ 8	20	10.9	9.7	19.3
62337	12	DD	31/ 34	25	-20.4	8.0	14.3
78970	12	DD	11/ -61	23	13.3	6.6	20.2
81405	00	DD	5/ -52	17	-19.2	8.9	26.4

MONITORING OF SATELLITE WINDS

MONITORING CENTRE: BRACKNELL

MONTH: December 1999

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from GOES-8, GOES-10, METEOSAT-5, METEOSAT-7, GMS-5, INSAT.

Standard of comparison :Background field from UKMO global model.

Selection Criteria :number of observations > 10.

Data Extracted :Layer 701 - 1000 hPa
401 - 700 hPa
101 - 400 hPa

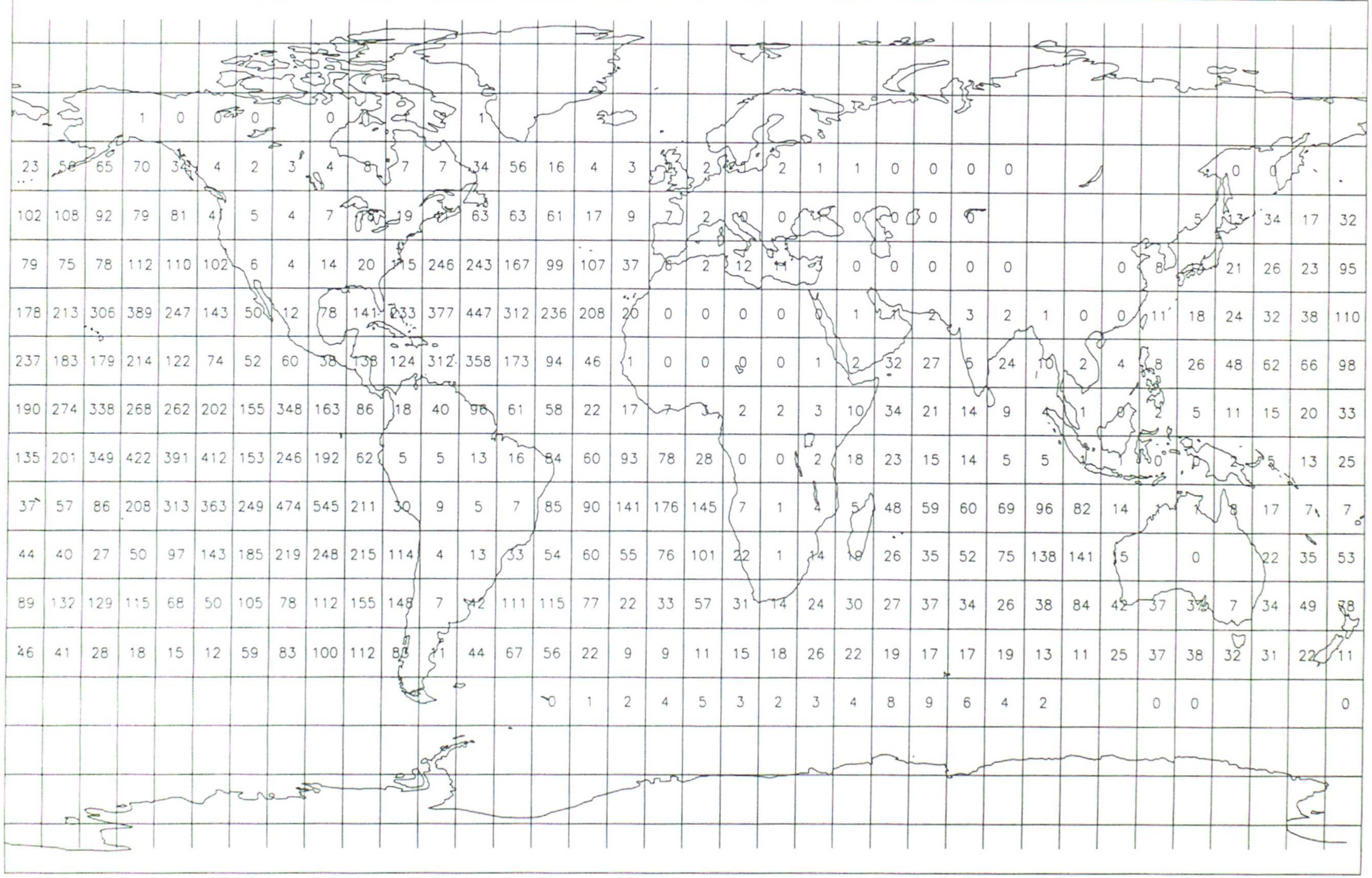
:Mean wind

:Mean observation minus background vector wind differences

:Mean observation minus background speed differences

:RMS of observation minus background vector differences

AVERAGE DAILY NUMBER OF SATOB OBSERVATIONS BETWEEN 701 AND 1000 HPA FIGURE 10
DECEMBER 1999


1 0 0 0 0 1
23 58 65 70 34 4 2 3 4 8 7 7 34 56 16 4 3 2 2 1 1 0 0 0 0 0 0
102 108 92 79 81 41 5 4 7 18 19 63 63 61 17 9 7 2 0 0 0 0 0 0 5 13 34 17 32
79 75 78 112 110 102 6 4 14 20 15 246 243 167 99 107 37 6 2 12 11 3 0 0 0 0 0 0 8 21 26 23 95
178 213 306 389 247 143 50 12 78 141 233 377 447 312 236 208 20 0 0 0 0 0 1 1 2 3 2 1 0 0 11 18 24 32 38 110
237 183 179 214 122 74 52 60 38 138 124 312 358 173 94 46 1 0 0 0 0 1 2 32 27 5 24 10 2 4 8 26 48 62 66 98
190 274 338 268 262 202 155 348 163 86 18 40 96 61 58 22 17 7 3 2 2 3 10 34 21 14 9 4 1 0 2 5 11 15 20 33
135 201 349 422 391 412 153 246 192 62 5 5 13 16 84 60 93 78 28 0 0 2 18 23 15 14 5 5 1 1 0 2 5 13 25
37 57 86 208 313 363 249 474 545 211 30 9 5 7 85 90 141 176 145 7 1 4 5 48 59 60 69 96 82 14 1 1 8 17 7 7
44 40 27 50 97 143 185 219 248 215 114 4 13 33 54 60 55 76 101 22 1 14 18 26 35 52 75 138 141 15 0 22 35 53
89 132 129 115 68 50 105 78 112 155 148 7 42 111 115 77 22 33 57 31 14 24 30 27 37 34 26 38 84 42 37 37 7 34 49 78
46 41 28 18 15 12 59 83 100 112 83 11 44 67 56 22 9 9 11 15 18 26 22 19 17 17 19 13 11 25 37 38 32 31 22 11
0 1 2 4 5 3 2 3 4 8 9 6 4 2 0 0 0

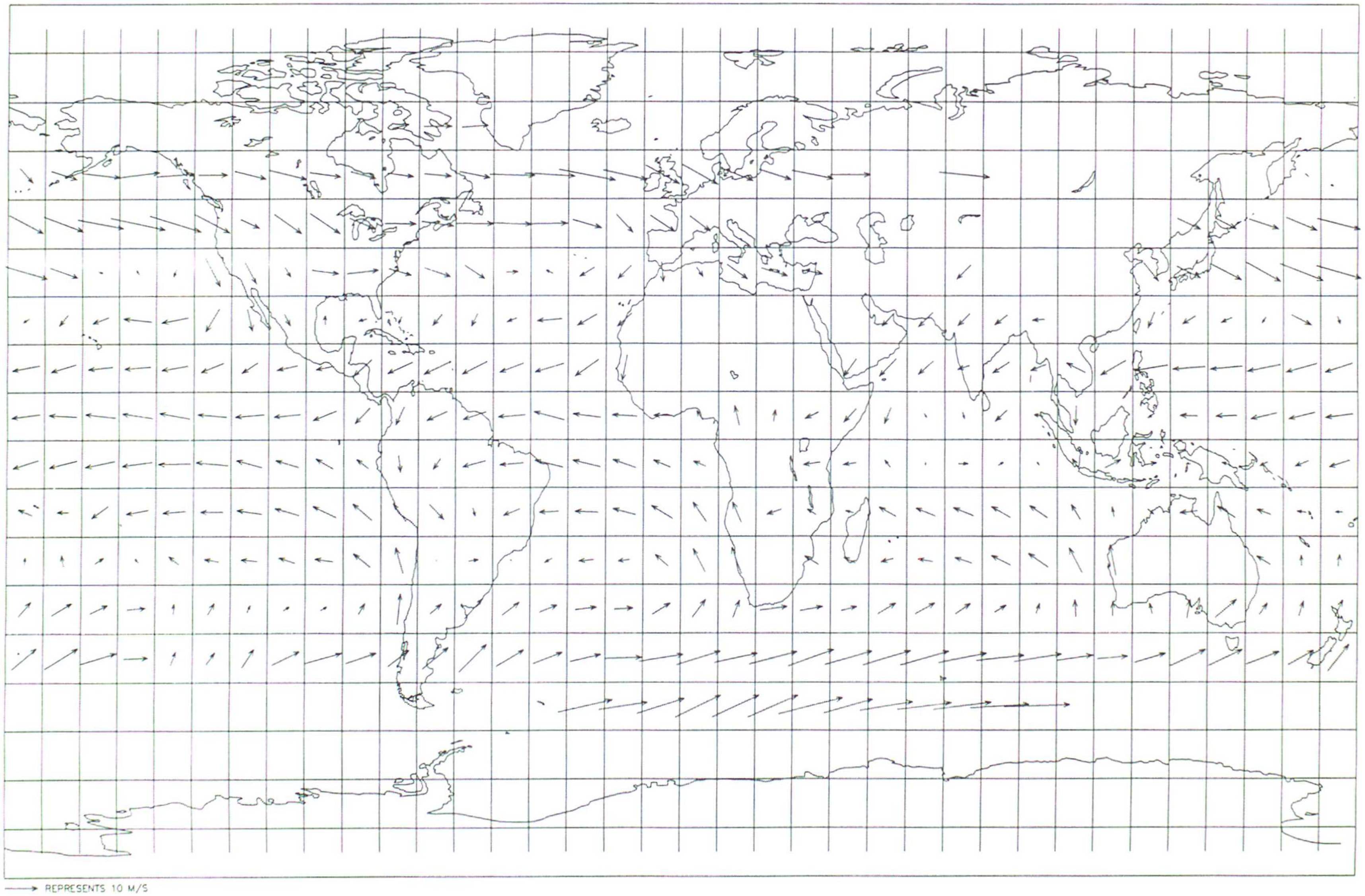
SATOB METEOSAT W/V VECTOR MEAN WINDS BETWEEN 701–1000 HPA

FIGURE 11

DECEMBER 1999

ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT


REPRESENTS 10 M/S

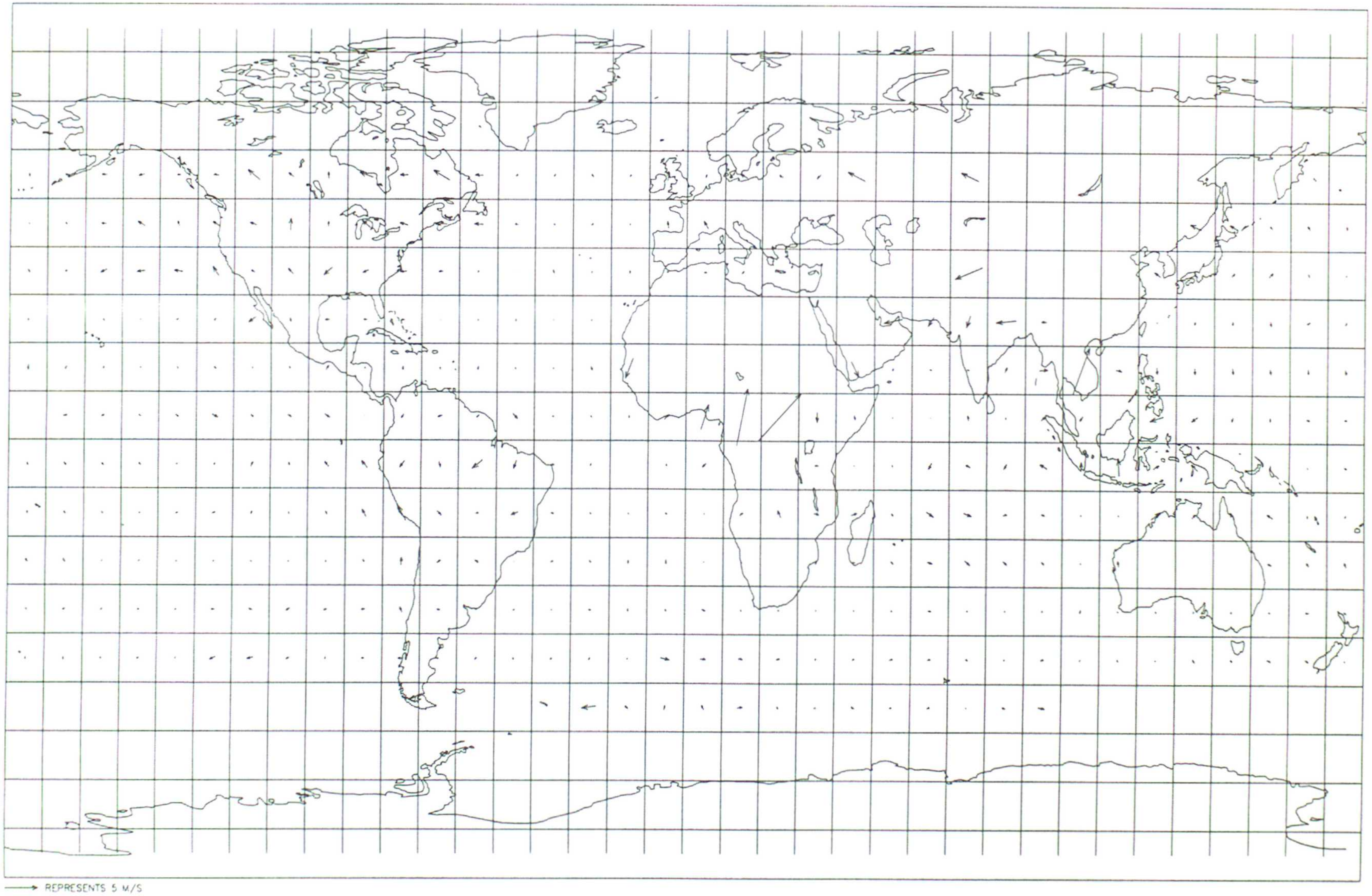
SATOB O-B VECTOR WIND DIFFERENCES BETWEEN 701-1000 HPA

DECEMBER 1999

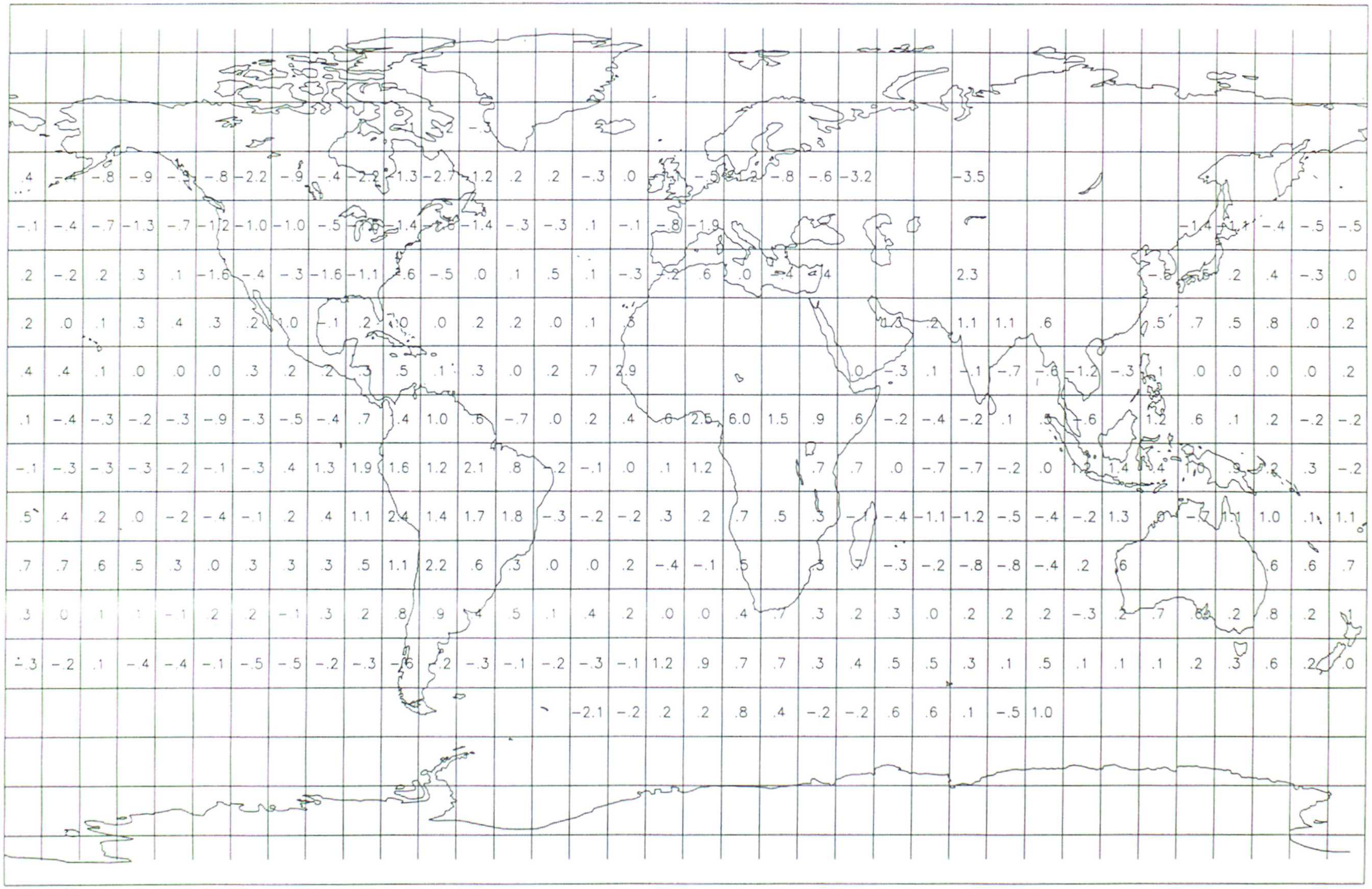
ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT

FIGURE 12

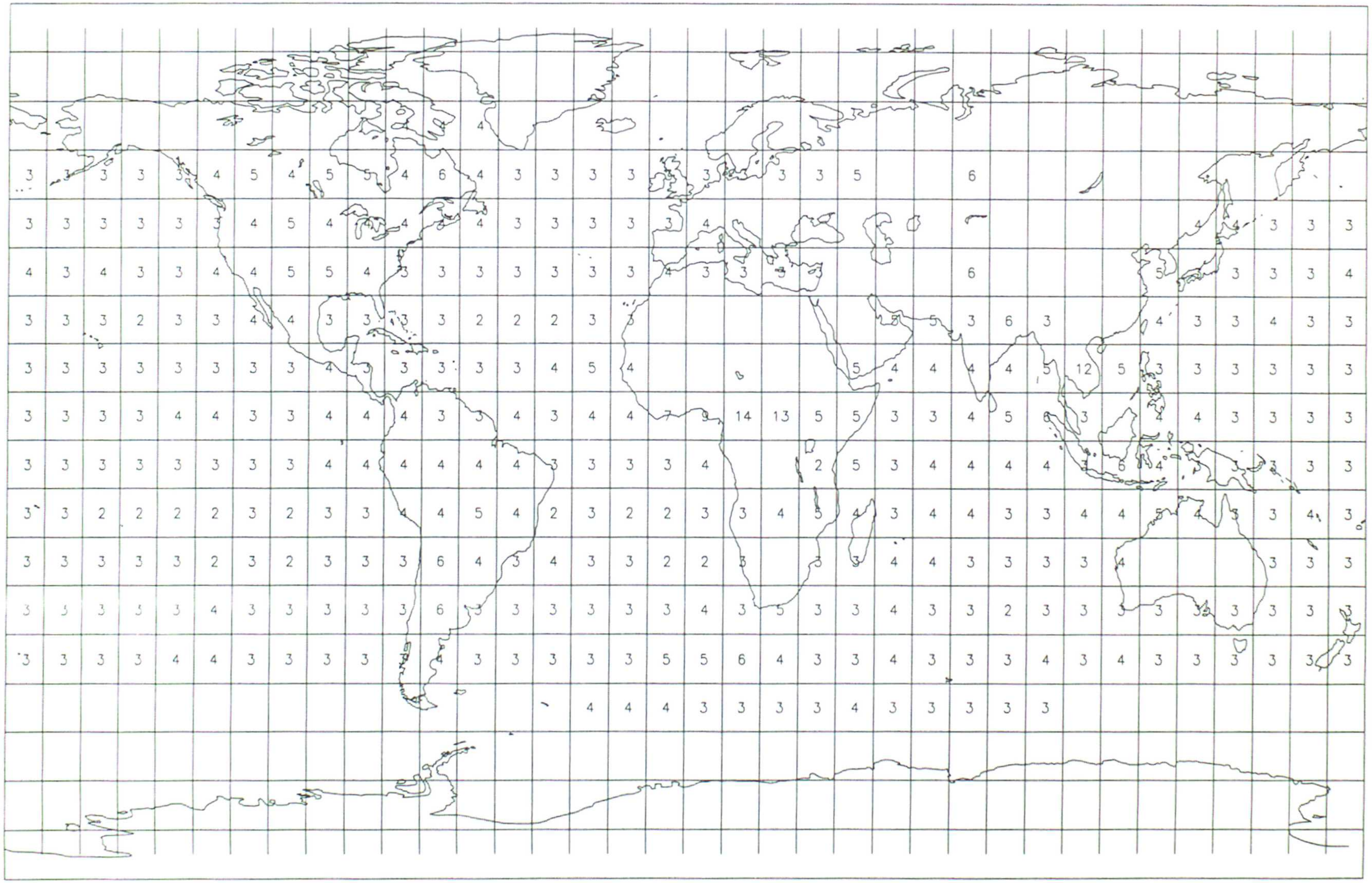


SATOBS : MEAN O–B SPEED DIFFERENCES (M/S) BETWEEN 701 AND 1000 HPA FIGURE 13
DECEMBER 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT

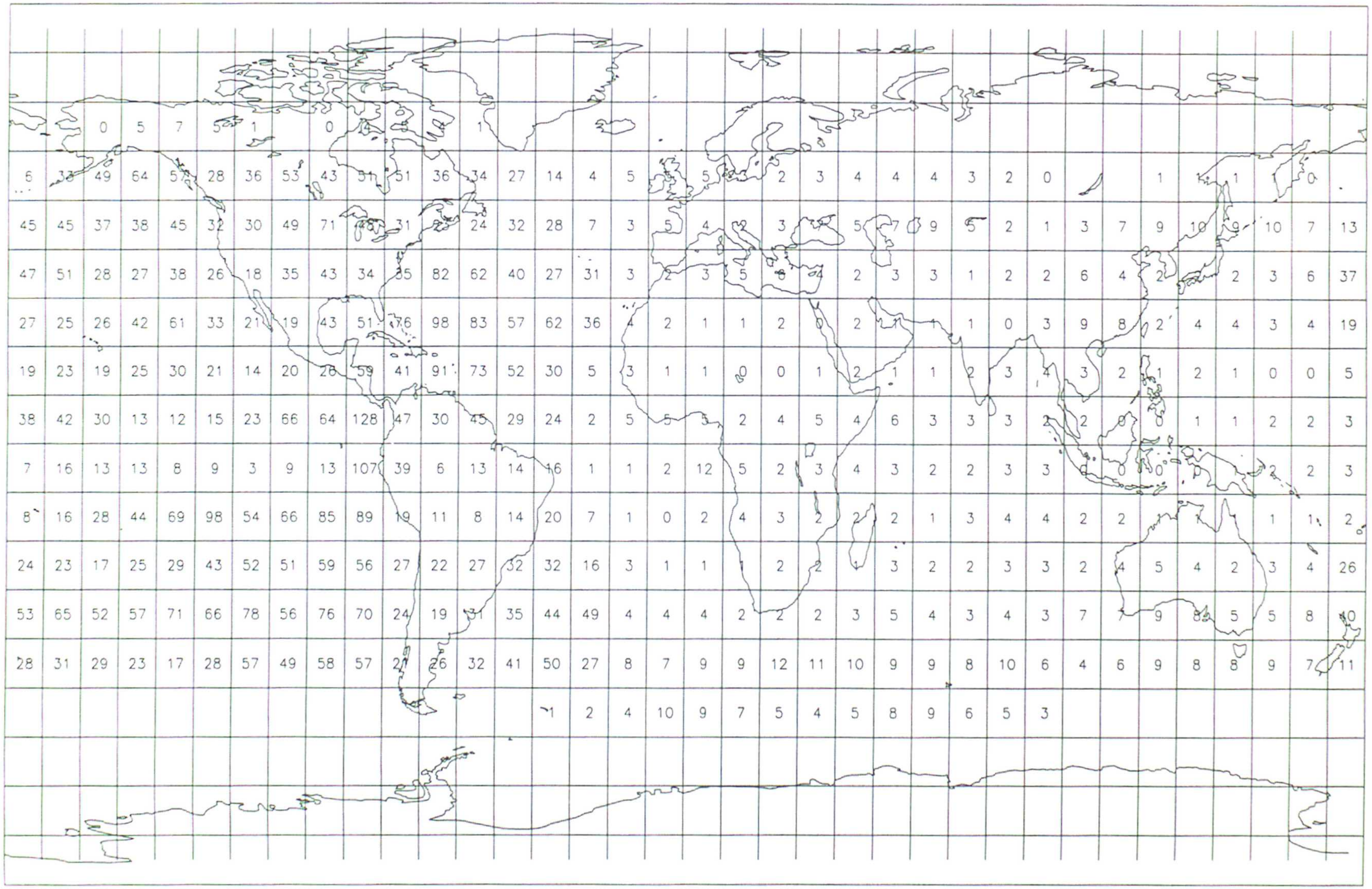


-.3
.4 -.4 -.8 -.9 -.8 -2.2 -.9 -.4 -2.2 -1.3 -2.7 -1.2 .2 .2 -.3 .0 -.1 -.5 -1.2 -.8 -.6 -3.2 -3.5
-.1 -.4 -.7 -1.3 -.7 -1.2 -1.0 -1.0 -.5 -1.6 -1.4 -1.6 -1.4 -.3 -.3 .1 -.1 -.8 -1.9 -1.4 -1.1 -.4 -.5 -.5
.2 -.2 .2 .3 .1 -1.6 -.4 -.3 -1.6 -1.1 .6 -.5 .0 .1 .5 .1 -.3 -.2 .6 .0 -.4 .4 2.3 -.6 -.5 .2 .4 -.3 .0
.2 .0 .1 .3 .4 .3 .2 1.0 -.1 .2 .0 .0 .2 .2 .0 .1 .3 1.3 .2 1.1 1.1 .6 .5 .7 .5 .8 .0 .2
.4 .4 .1 .0 .0 .0 .3 .2 .2 .3 .5 .1 .3 .0 .2 .7 2.9 .0 -.3 .1 -.1 -.7 -.6 -1.2 -.3 .1 .0 .0 .0 .0 .2
.1 -.4 -.3 -.2 -.3 -.9 -.3 -.5 -.4 .7 .4 1.0 .6 -.7 .0 .2 .4 .6 2.5 6.0 1.5 .9 .6 -.2 -.4 -.2 .1 .5 -.6 1.2 .6 .1 .2 -.2 -.2
-.1 -.3 -.3 -.3 -.2 -.1 -.3 .4 1.3 1.9 1.6 1.2 2.1 .8 -.2 -.1 .0 .1 1.2 .7 .7 .0 -.7 -.7 -.2 .0 1.2 1.4 .4 1.0 .9 .2 .3 -.2
.5 .4 .2 .0 -.2 -.4 -.1 .2 .4 1.1 2.4 1.4 1.7 1.8 -.3 -.2 -.2 .3 .2 .7 .5 .3 -.1 -.4 -1.1 -1.2 -.5 -.4 -.2 1.3 .0 -.7 1.1 1.0 .1 1.1
.7 .7 .6 .5 .3 .0 .3 .3 .3 .5 1.1 2.2 .6 .3 .0 .0 .2 -.4 -.1 .5 .3 .7 -.3 -.2 -.8 -.8 -.4 .2 .6 .6 .6 .7
.3 .0 .1 .1 -.1 .2 .2 -.1 .3 .2 .8 .9 .4 .5 .1 .4 .2 .0 .0 .4 .7 .3 .2 .3 .0 .2 .2 .2 -.3 .2 .7 .6 .2 .8 .2 .1
-.3 -.2 .1 -.4 -.4 -.1 -.5 -.5 -.2 -.3 -.6 .2 -.3 -.1 -.2 -.3 -.1 1.2 .9 .7 .7 .3 .4 .5 .5 .3 .1 .5 .1 .1 .1 .2 .3 .6 .2 .0
-2.1 -.2 .2 .2 .8 .4 -.2 -.2 .6 .6 .1 -.5 1.0

SATOBS : RMS O-B VECTOR DIFFERENCES (M/S) BETWEEN 701 AND 1000 HPA FIGURE 14
DECEMBER 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT

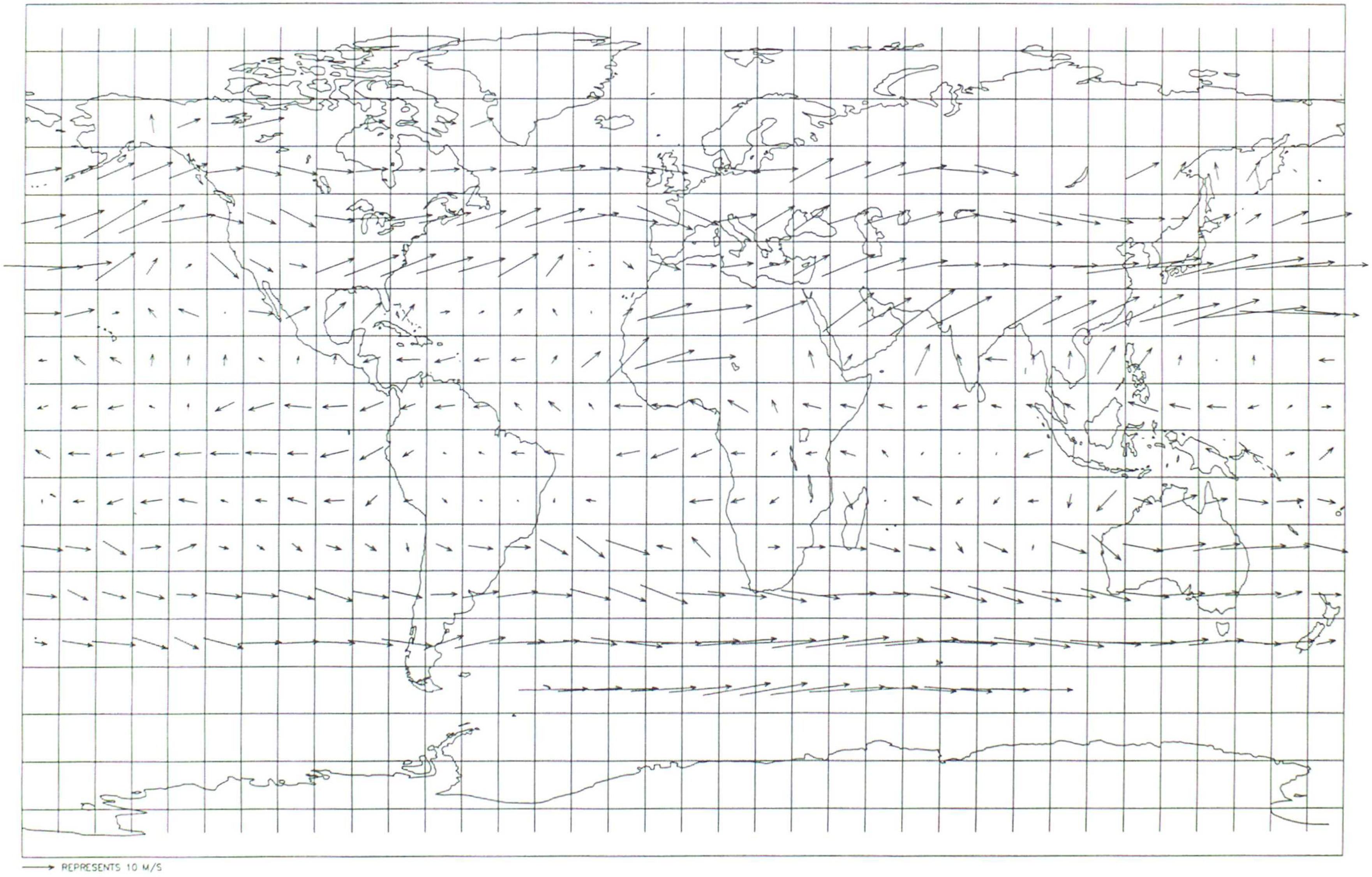

4
3 3 3 3 3 4 5 4 5 5 4 6 4 3 3 3 3 3 3 3 5 6
3 3 3 3 3 3 4 5 4 4 4 4 3 3 3 3 3 4 4 4 3 3 3
4 3 4 3 3 4 4 5 5 4 3 3 3 3 3 3 3 4 3 3 6 5 3 3 3 4
3 3 3 2 3 3 4 4 3 3 3 3 2 2 2 3 3 5 5 3 6 3 4 3 3 4 3 3
3 3 3 3 3 3 3 3 4 3 3 3 3 3 4 5 4 5 4 4 4 4 5 12 5 3 3 3 3 3 3
3 3 3 3 4 4 3 3 4 4 4 3 3 4 3 4 4 7 9 14 13 5 5 3 3 4 5 6 3 4 4 3 3 3 3
3 3 3 3 3 3 3 3 4 4 4 4 4 4 3 3 3 3 4 2 5 3 4 4 4 4 3 6 4 3 3 3
3 3 2 2 2 2 3 2 3 3 4 4 5 4 2 3 2 2 3 3 4 5 4 3 4 4 3 3 4 4 5 4 3 3 4 3
3 3 3 3 3 2 3 2 3 3 3 6 4 3 4 3 3 2 2 3 3 3 4 4 3 3 3 3 4 3 3 3
3 3 3 3 3 4 3 3 3 3 3 6 3 3 3 3 3 3 4 3 5 3 3 4 3 3 2 3 3 3 3 3 3 3 3 3
3 3 3 3 4 4 3 3 3 3 4 3 3 3 3 3 5 5 6 4 3 3 4 3 3 3 4 3 4 3 3 3 3 3 3
4 4 4 3 3 3 3 4 3 3 3 3 3

AVERAGE DAILY NUMBER OF SATOB OBSERVATIONS BETWEEN 401 AND 700 HPA FIGURE 15
DECEMBER 1999


0 5 7 5 1 0 4 8 1
6 33 49 64 57 28 36 53 43 51 51 36 34 27 14 4 5 5 5 2 3 4 4 4 3 2 0 1 1 1 1 0
45 45 37 38 45 32 30 49 71 48 31 23 24 32 28 7 3 5 4 2 3 7 5 7 9 5 2 1 3 7 9 10 9 10 7 13
47 51 28 27 38 26 18 35 43 34 35 82 62 40 27 31 3 2 3 5 8 4 2 3 3 1 2 2 6 4 2 2 3 6 37
27 25 26 42 61 33 21 19 43 51 76 98 83 57 62 36 4 2 1 1 2 0 2 1 1 1 0 3 9 8 2 4 4 3 4 19
19 23 19 25 30 21 14 20 26 59 41 91 73 52 30 5 3 1 1 0 0 1 2 1 1 2 3 4 3 2 1 2 1 0 0 5
38 42 30 13 12 15 23 66 64 128 47 30 45 29 24 2 5 5 5 2 4 5 4 6 3 3 3 2 2 0 0 1 1 2 2 3
7 16 13 13 8 9 3 9 13 107 39 6 13 14 16 1 1 2 12 5 2 3 4 3 2 2 3 3 0 0 0 0 1 2 2 3
8 16 28 44 69 98 54 66 85 89 19 11 8 14 20 7 1 0 2 4 3 2 2 2 1 3 4 4 2 2 1 1 1 1 1 2
24 23 17 25 29 43 52 51 59 56 27 22 27 32 32 16 3 1 1 1 2 2 1 3 2 2 3 3 2 4 5 4 2 3 4 26
53 65 52 57 71 66 78 56 76 70 24 19 31 35 44 49 4 4 4 2 2 2 3 5 4 3 4 3 7 7 9 8 5 5 8 10
28 31 29 23 17 28 57 49 58 57 27 26 32 41 50 27 8 7 9 9 12 11 10 9 9 8 10 6 4 6 9 8 8 9 7 11
1 2 4 10 9 7 5 4 5 8 9 6 5 3

SATOB VECTOR MEAN WINDS BETWEEN 401-700 HPA
DECEMBER 1999
ALL OBSERVATIONS
ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT

FIGURE 16


→ REPRESENTS 10 M/S

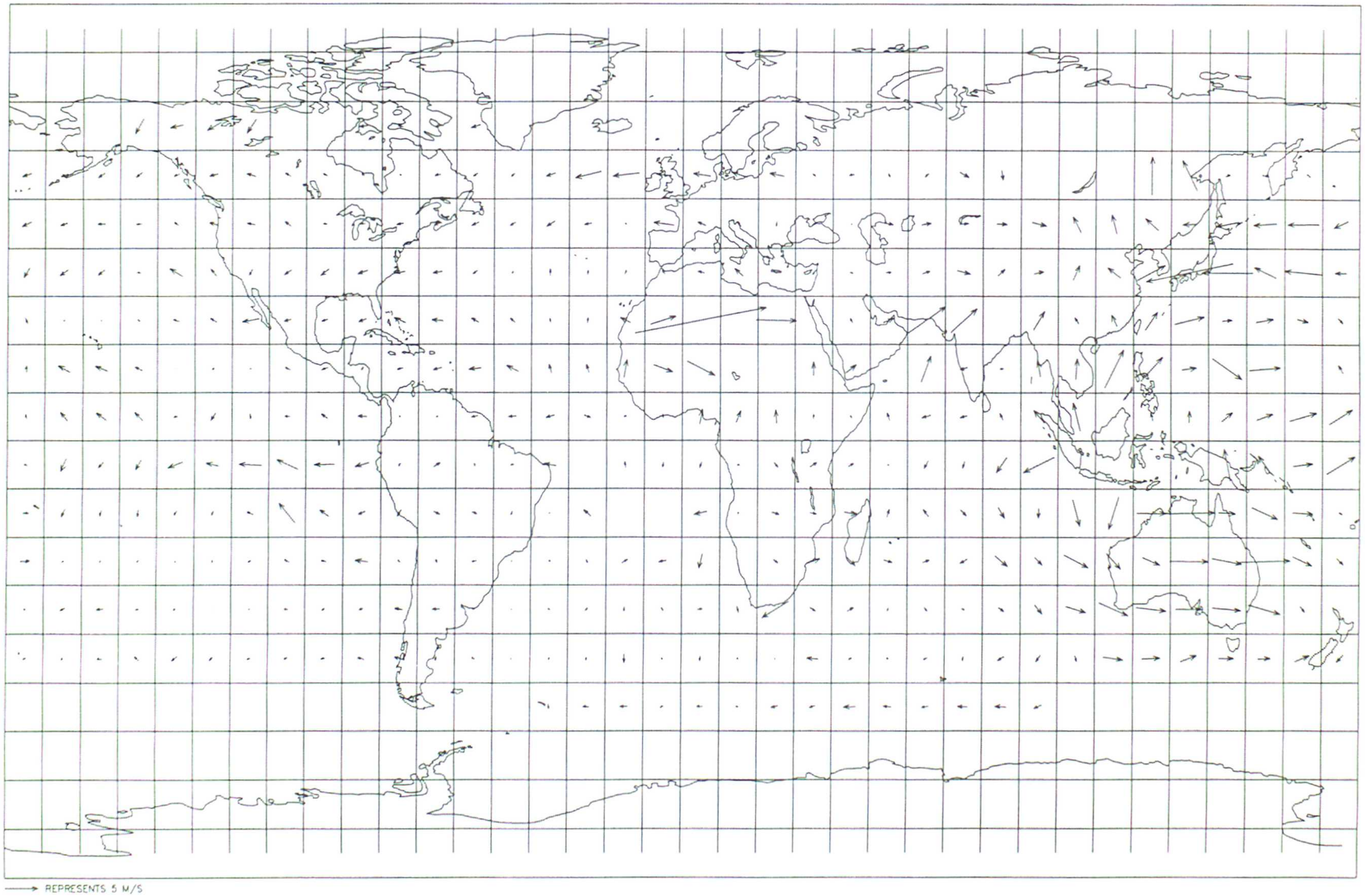
SATOB O-B VECTOR WIND DIFFERENCES BETWEEN 401–700 HPA

FIGURE 17

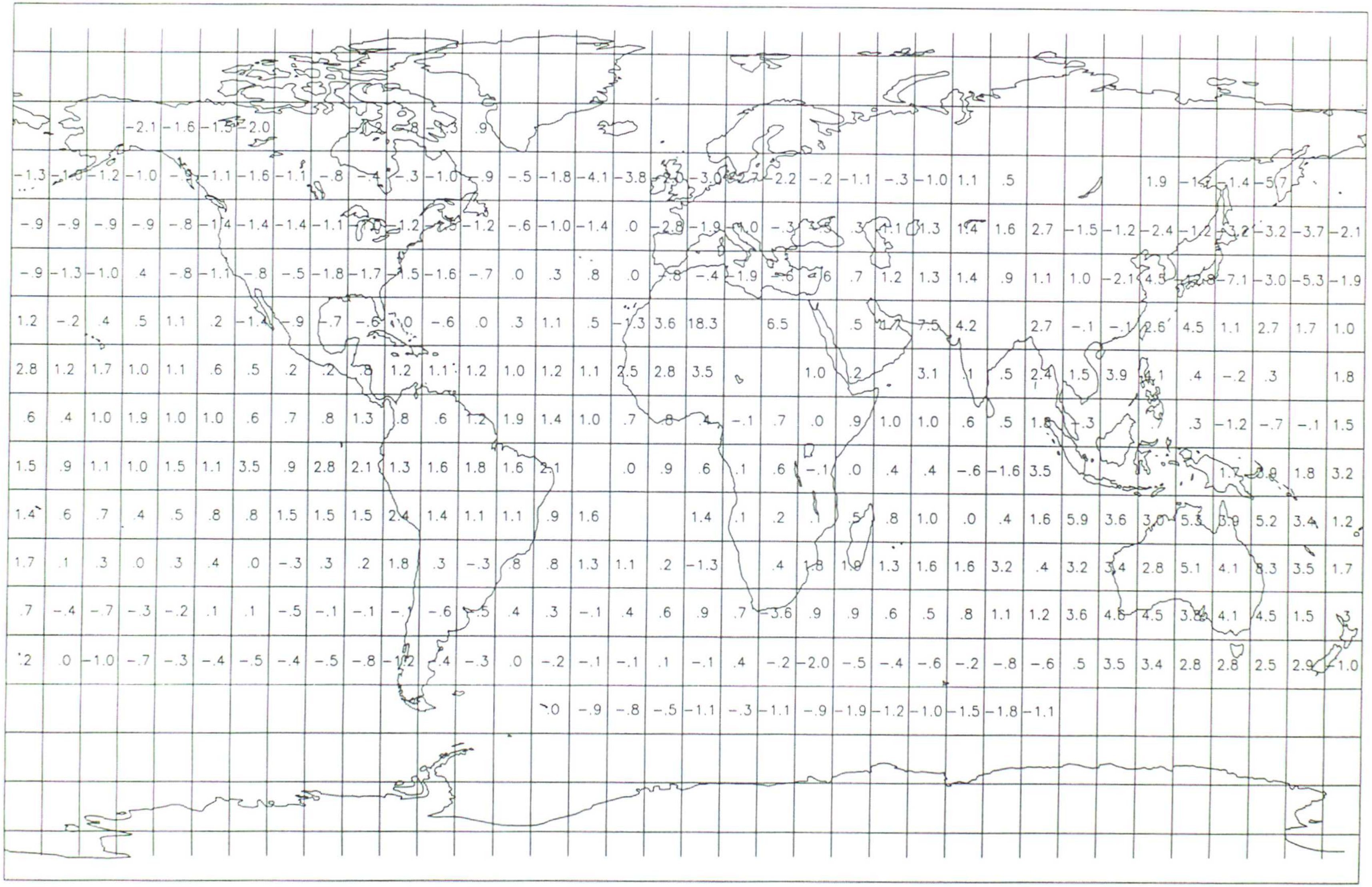
DECEMBER 1999

ALL OBSERVATIONS

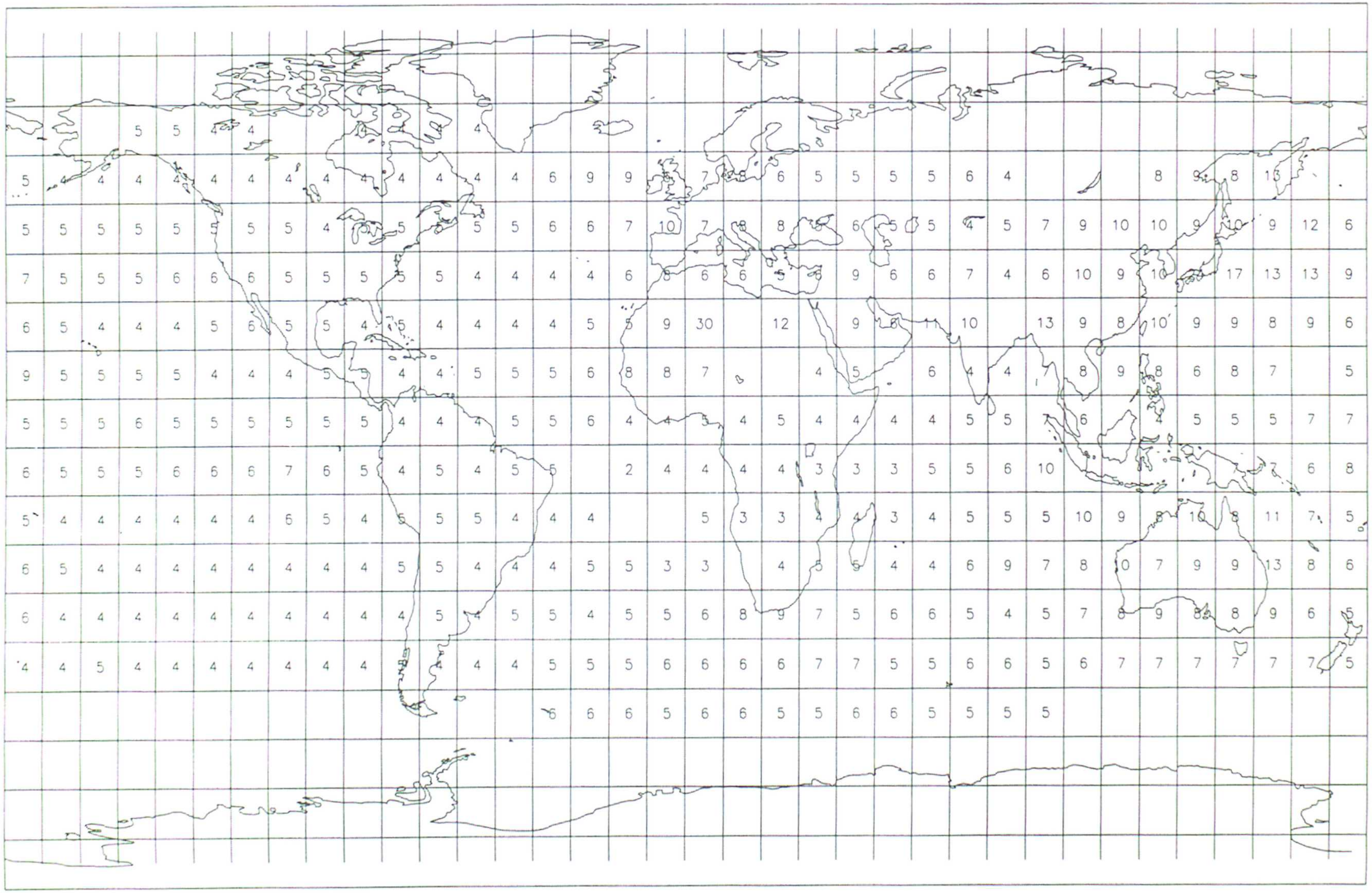
ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT



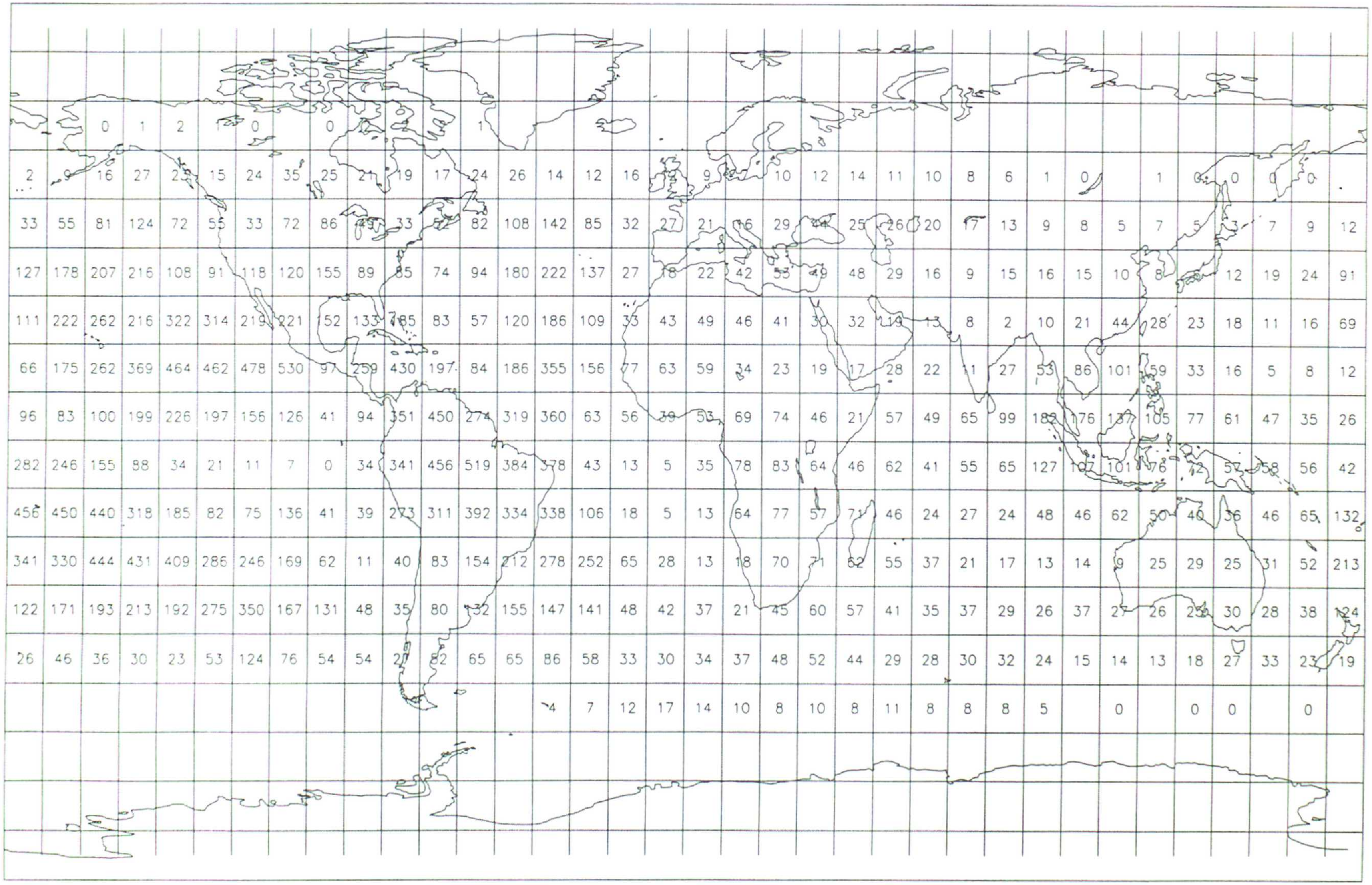
SATOBS : MEAN O–B SPEED DIFFERENCES (M/S) BETWEEN 401 AND 700 HPA FIGURE 18
DECEMBER 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT


-2.1 -1.6 -1.5 -2.0 -.2 -.8 -1.3 .9
-1.3 -1.0 -1.2 -1.0 -.9 -1.1 -1.6 -1.1 -.8 -.4 -.3 -1.0 -.9 -.5 -1.8 -4.1 -3.8 -2.0 -3.0 -2.7 -2.2 -.2 -1.1 -.3 -1.0 1.1 .5 1.9 -1.4 -1.4 -5.7
-.9 -.9 -.9 -.9 -.8 -1.4 -1.4 -1.4 -1.1 -1.0 -1.2 -1.5 -1.2 -.6 -1.0 -1.4 .0 -2.8 -1.9 -1.0 -.3 -3.3 .3 -1.1 1.3 1.4 1.6 2.7 -1.5 -1.2 -2.4 -1.2 -3.2 -3.2 -3.7 -2.1
-.9 -1.3 -1.0 .4 -.8 -1.1 -.8 -.5 -1.8 -1.7 -1.5 -1.6 -.7 .0 .3 .8 .0 -.8 -.4 -1.9 -.6 .6 .7 1.2 1.3 1.4 .9 1.1 1.0 -2.1 4.5 -2.8 -7.1 -3.0 -5.3 -1.9
1.2 -.2 .4 .5 1.1 .2 -1.4 -.9 -.7 -.6 .0 -.6 .0 .3 1.1 .5 -1.3 3.6 18.3 6.5 .5 1.7 7.5 4.2 2.7 -.1 -.1 2.6 4.5 1.1 2.7 1.7 1.0
2.8 1.2 1.7 1.0 1.1 .6 .5 .2 .2 .8 1.2 1.1 1.2 1.0 1.2 1.1 2.5 2.8 3.5 1.0 .2 3.1 .1 .5 2.4 1.5 3.9 4.1 .4 -.2 .3 1.8
.6 .4 1.0 1.9 1.0 1.0 .6 .7 .8 1.3 .8 .6 1.2 1.9 1.4 1.0 .7 .8 .4 -.1 .7 .0 .9 1.0 1.0 .6 .5 1.8 -.3 .7 .3 -1.2 -.7 -.1 1.5
1.5 .9 1.1 1.0 1.5 1.1 3.5 .9 2.8 2.1 1.3 1.6 1.8 1.6 2.1 .0 .9 .6 .1 .6 -.1 .0 .4 .4 -.6 -1.6 3.5 1.7 3.8 1.8 3.2
1.4 .6 .7 .4 .5 .8 .8 1.5 1.5 1.5 2.4 1.4 1.1 1.1 .9 1.6 1.4 .1 .2 .1 .5 .8 1.0 .0 .4 1.6 5.9 3.6 3.0 5.3 3.9 5.2 3.4 1.2
1.7 .1 .3 .0 .3 .4 .0 -.3 .3 .2 1.8 .3 -.3 .8 .8 1.3 1.1 .2 -1.3 .4 1.8 1.9 1.3 1.6 1.6 3.2 .4 3.2 3.4 2.8 5.1 4.1 8.3 3.5 1.7
.7 -.4 -.7 -.3 -.2 .1 .1 -.5 -.1 -.1 -.1 -.6 -.5 .4 .3 -.1 .4 .6 .9 .7 -3.6 .9 .9 .6 .5 .8 1.1 1.2 3.6 4.6 4.5 3.8 4.1 4.5 1.5 .3
.2 .0 -1.0 -.7 -.3 -.4 -.5 -.4 -.5 -.8 -1.2 -.4 -.3 .0 -.2 -.1 -.1 .1 -.1 .4 -.2 -2.0 -.5 -.4 -.6 -.2 -.8 -.6 .5 3.5 3.4 2.8 2.8 2.5 2.9 -1.0
.0 -.9 -.8 -.5 -1.1 -.3 -1.1 -.9 -1.9 -1.2 -1.0 -1.5 -1.8 -1.1

SATOBS : RMS O-B VECTOR DIFFERENCES (M/S) BETWEEN 401 AND 700 HPA FIGURE 19
DECEMBER 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT



AVERAGE DAILY NUMBER OF SATOB OBSERVATIONS BETWEEN 101 AND 400 HPA FIGURE 20
DECEMBER 1999


0 1 2 1 0 0 1
2 9 16 27 23 15 24 35 25 21 19 17 24 26 14 12 16 9 10 12 14 11 10 8 6 1 0 1 0 0 0 0
33 55 81 124 72 55 33 72 86 49 33 52 82 108 142 85 32 27 21 16 29 44 25 26 20 17 13 9 8 5 7 5 3 7 9 12
127 178 207 216 108 91 118 120 155 89 85 74 94 180 222 137 27 18 22 42 53 49 48 29 16 9 15 16 15 10 8 12 19 24 91
111 222 262 216 322 314 219 221 152 133 185 83 57 120 186 109 33 43 49 46 41 30 32 19 13 8 2 10 21 44 28 23 18 11 16 69
66 175 262 369 464 462 478 530 97 259 430 197 84 186 355 156 77 63 59 34 23 19 17 28 22 11 27 53 86 101 59 33 16 5 8 12
96 83 100 199 226 197 156 126 41 94 351 450 274 319 360 63 56 39 53 69 74 46 21 57 49 65 99 182 176 137 105 77 61 47 35 26
282 246 155 88 34 21 11 7 0 34 341 456 519 384 378 43 13 5 35 78 83 64 46 62 41 55 65 127 107 101 76 72 57 58 56 42
456 450 440 318 185 82 75 136 41 39 273 311 392 334 338 106 18 5 13 64 77 57 71 46 24 27 24 48 46 62 50 40 36 46 65 132
341 330 444 431 409 286 246 169 62 11 40 83 154 212 278 252 65 28 13 18 70 71 62 55 37 21 17 13 14 9 25 29 25 31 52 213
122 171 193 213 192 275 350 167 131 48 35 80 132 155 147 141 48 42 37 21 45 60 57 41 35 37 29 26 37 27 26 25 30 28 38 124
26 46 36 30 23 53 124 76 54 54 27 82 65 65 86 58 33 30 34 37 48 52 44 29 28 30 32 24 15 14 13 18 27 33 23 19
4 7 12 17 14 10 8 10 8 11 8 8 8 5 0 0 0 0

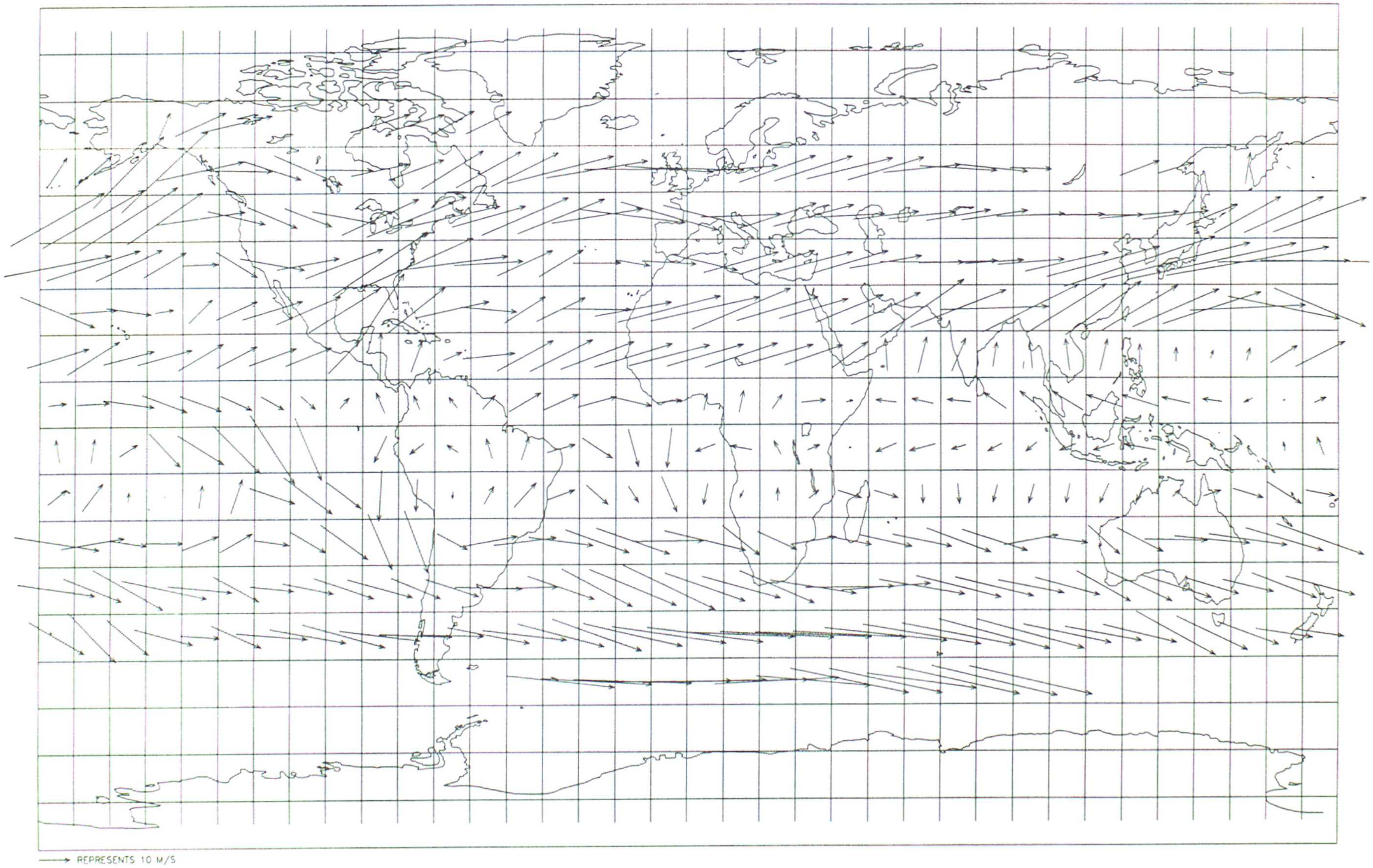
SATOB METEOSAT W/V VECTOR MEAN WINDS BETWEEN 101–400 HPA

FIGURE 21

DECEMBER 1999

ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT


→ REPRESENTS 10 M/S

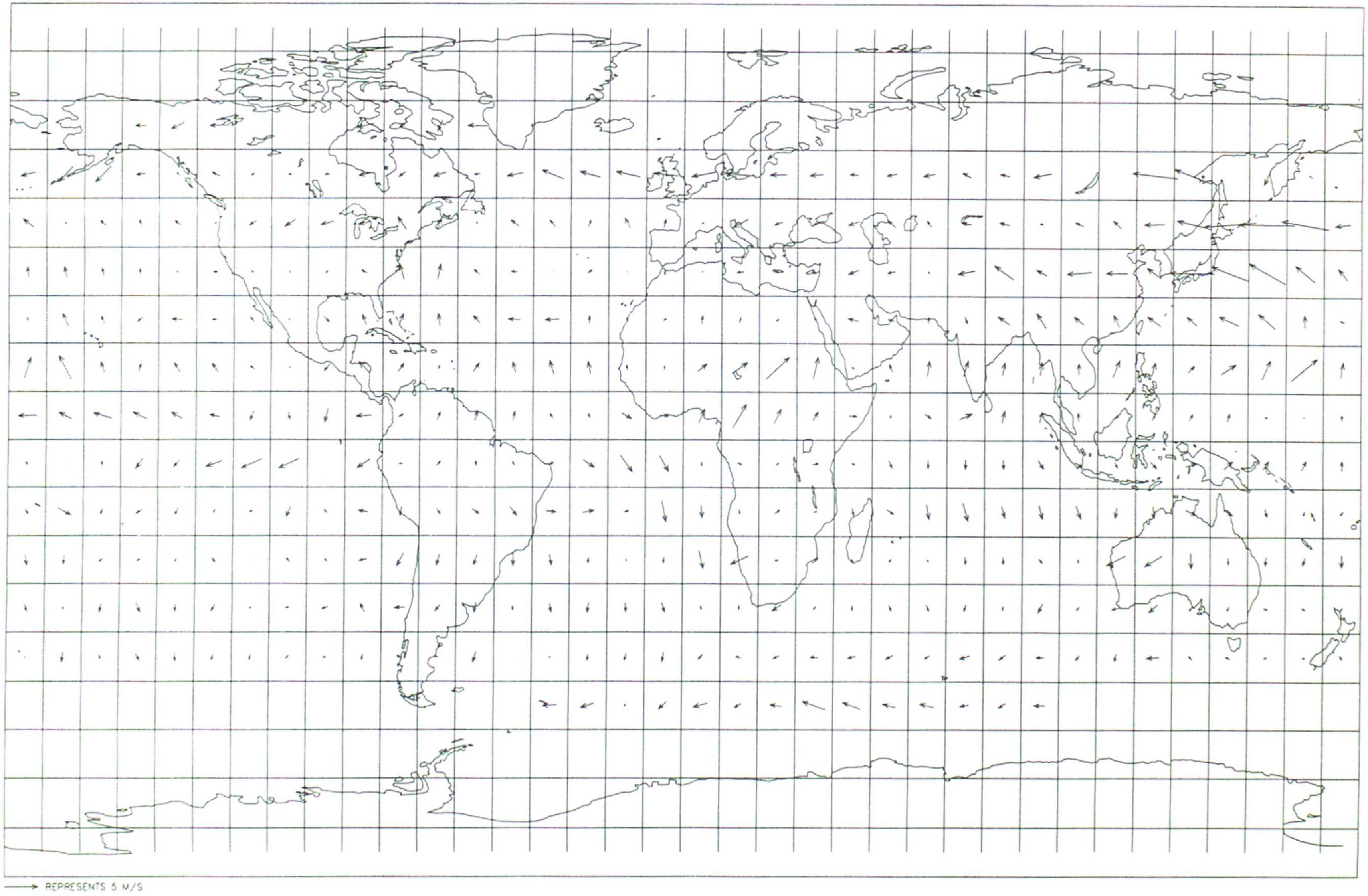
SATOB O-B VECTOR WIND DIFFERENCES BETWEEN 101-400 HPA

DECEMBER 1999

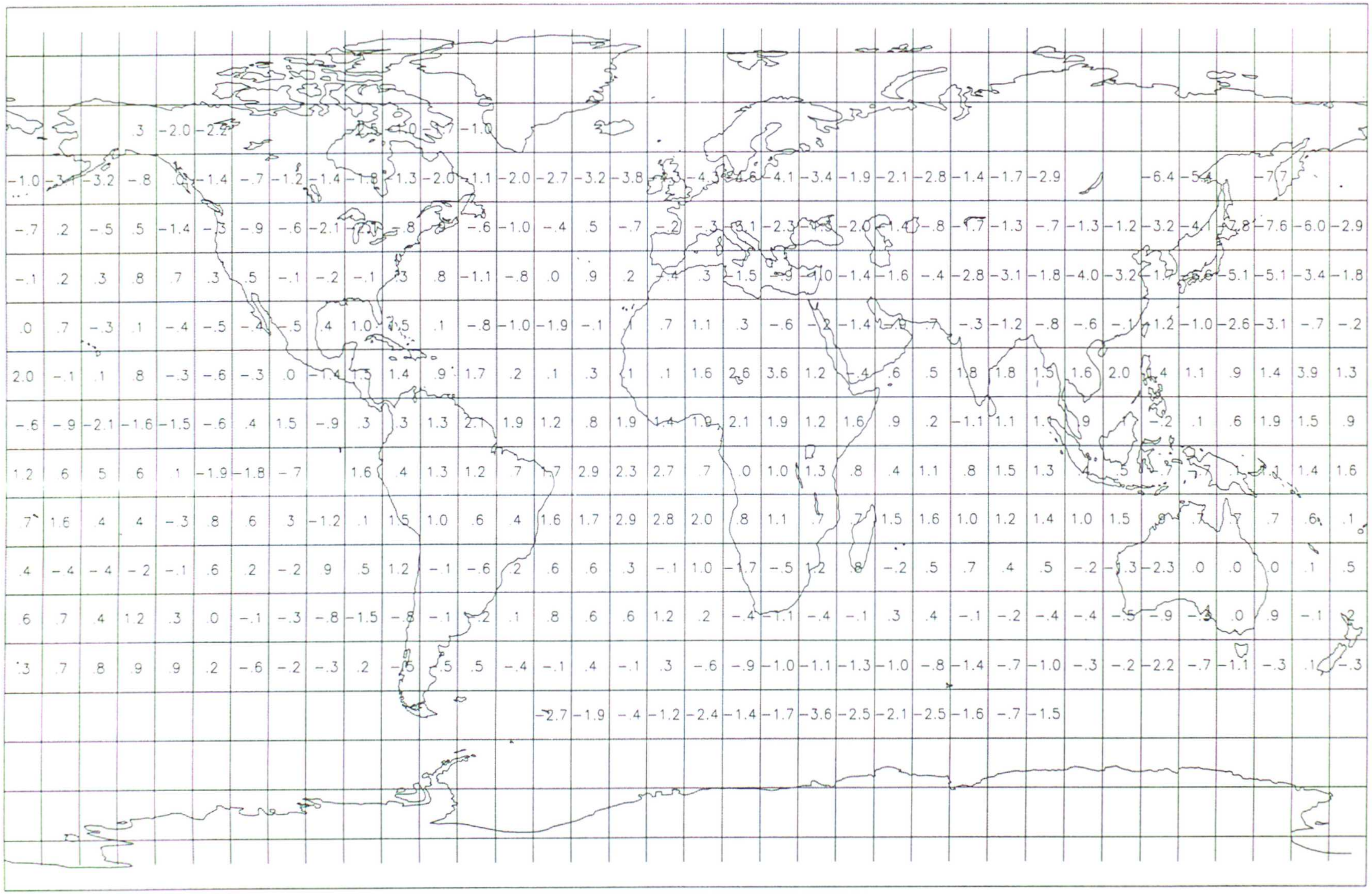
ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT

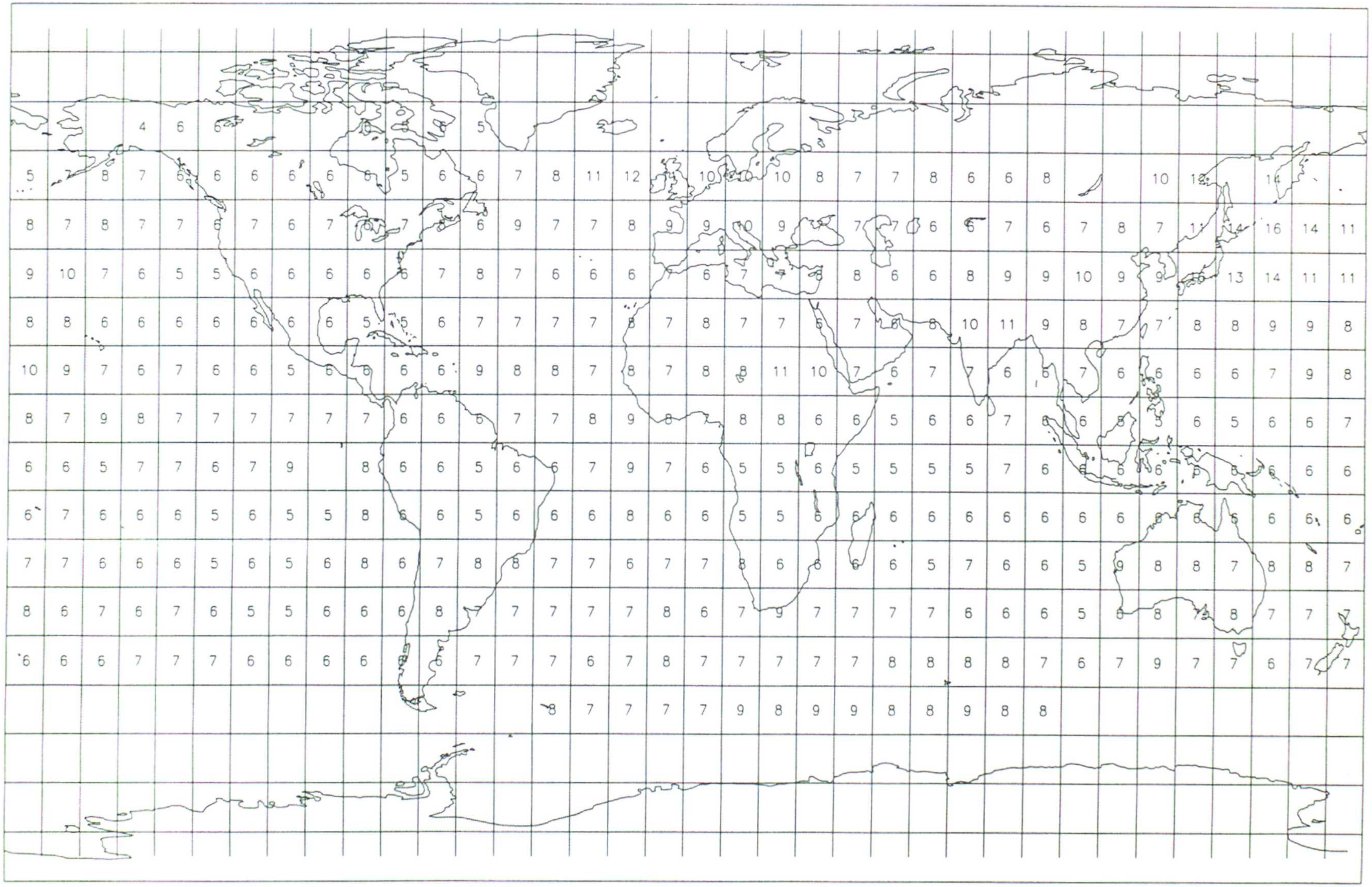
FIGURE 22



SATOBS : MEAN O–B SPEED DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA FIGURE 23
DECEMBER 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT


.3 -2.0 -2.2 -1.5 -1.0 -.7 -1.0
-1.0 -3.4 -3.2 -.8 .0 -1.4 -.7 -1.2 -1.4 -1.8 -1.3 -2.0 -1.1 -2.0 -2.7 -3.2 -3.8 -4.3 -4.3 -4.6 -4.1 -3.4 -1.9 -2.1 -2.8 -1.4 -1.7 -2.9 -6.4 -5.4 -7.7
-.7 .2 -.5 .5 -1.4 -.3 -.9 -.6 -2.1 -.7 -.8 -.6 -1.0 -.4 .5 -.7 -.2 -.3 -3.1 -2.3 -.3 -2.0 -1.4 -.8 -1.7 -1.3 -.7 -1.3 -1.2 -3.2 -4.1 -7.8 -7.6 -6.0 -2.9
-.1 .2 .3 .8 .7 .3 .5 -.1 -.2 -.1 .3 .8 -1.1 -.8 .0 .9 .2 .4 .3 -1.5 -.9 -1.0 -1.4 -1.6 -.4 -2.8 -3.1 -1.8 -4.0 -3.2 -1.7 -5.6 -5.1 -5.1 -3.4 -1.8
.0 .7 -.3 .1 -.4 -.5 -.4 -.5 .4 1.0 1.5 .1 -.8 -1.0 -1.9 -.1 .1 .7 1.1 .3 -.6 -.2 -1.4 -1.0 .7 -.3 -1.2 -.8 -.6 -.1 1.2 -1.0 -2.6 -3.1 -.7 -.2
2.0 -.1 .1 .8 -.3 -.6 -.3 .0 -1.4 1.5 1.4 .9 1.7 .2 .1 .3 .1 .1 1.6 2.6 3.6 1.2 -.4 .6 .5 1.8 1.8 1.5 1.6 2.0 .4 1.1 .9 1.4 3.9 1.3
-.6 -.9 -2.1 -1.6 -1.5 -.6 .4 1.5 -.9 .3 .3 1.3 2.1 1.9 1.2 .8 1.9 1.4 1.9 2.1 1.9 1.2 1.6 .9 .2 -1.1 1.1 1.1 .9 .1 -.2 .1 .6 1.9 1.5 .9
1.2 .6 .5 .6 .1 -1.9 -1.8 -.7 1.6 .4 1.3 1.2 .7 1.7 2.9 2.3 2.7 .7 .0 1.0 1.3 .8 .4 1.1 .8 1.5 1.3 .4 .5 .7 .7 .1 1.4 1.6
.7 1.6 .4 .4 -.3 .8 .6 .3 -1.2 .1 1.5 1.0 .6 .4 1.6 1.7 2.9 2.8 2.0 .8 1.1 .7 .7 1.5 1.6 1.0 1.2 1.4 1.0 1.5 .9 .7 .7 .7 .6 .1
.4 -.4 -.4 -.2 -.1 .6 .2 -.2 .9 .5 1.2 -.1 -.6 .2 .6 .6 .3 -.1 1.0 -1.7 -.5 1.2 .8 -.2 .5 .7 .4 .5 -.2 -1.3 -2.3 .0 .0 .0 .1 .5
.6 .7 .4 1.2 .3 .0 -.1 -.3 -.8 -1.5 -.8 -.1 .2 .1 .8 .6 .6 1.2 .2 -.4 -1.1 -.4 -.1 .3 .4 -.1 -.2 -.4 -.4 -.5 -.9 -.3 .0 .9 -.1 .2
.3 .7 .8 .9 .9 .2 -.6 -.2 -.3 .2 -.5 .5 .5 -.4 -.1 .4 -.1 .3 -.6 -.9 -1.0 -1.1 -1.3 -1.0 -.8 -1.4 -.7 -1.0 -.3 -.2 -2.2 -.7 -1.1 -.3 .1 -.3
-2.7 -1.9 -.4 -1.2 -2.4 -1.4 -1.7 -3.6 -2.5 -2.1 -2.5 -1.6 -.7 -1.5

SATOBS : RMS O-B VECTOR DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA FIGURE 24
DECEMBER 1999
USING ALL OBSERVATIONS
VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT



MONITORING OF SATELLITE TEMPERATURES

MONITORING CENTRE: BRACKNELL

MONTH: December 1999

Monitoring procedures

Period :One calendar month.

Data monitored :Reports from NOAA-15.

Standard of comparison :Background field from UKMO global model.

Selection Criteria :All soundings.

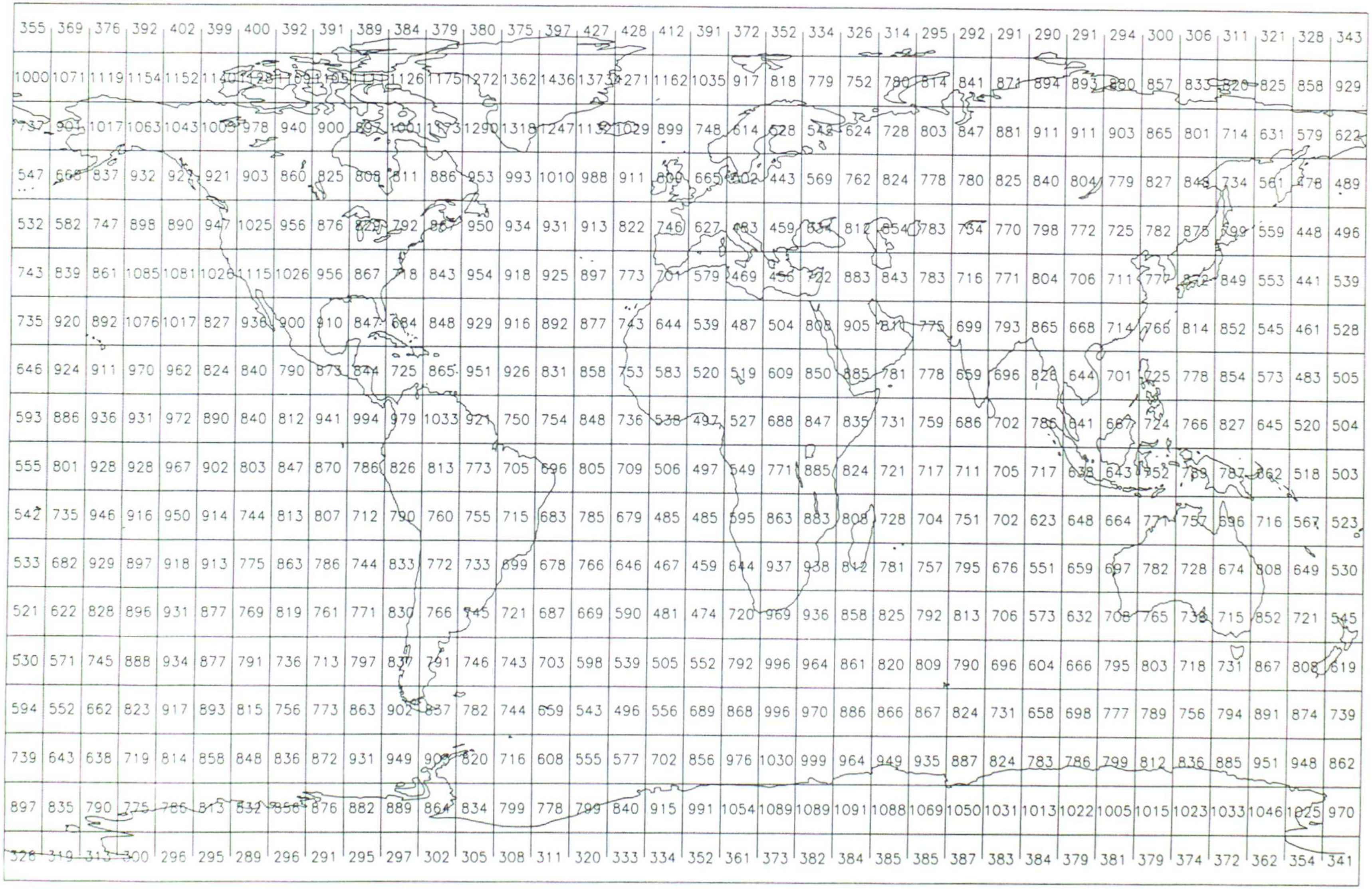
Data Extracted :Sounding channels (and approximate weighting function peaks, hPa)

- HIRS8 (Surface)
- HIRS15 (700)
- HIRS11 (500-700)
- HIRS4 (400)
- AMSUA5 (700)
- AMSUA7 (300)
- AMSUA9 (100)

:Mean and standard deviation observation-minus-background brightness temperature differences

ATOVS : MEAN DAILY NUMBER OF OBSERVATIONS
DECEMBER 1999
NOAA-15, USING ALL OBSERVATIONS

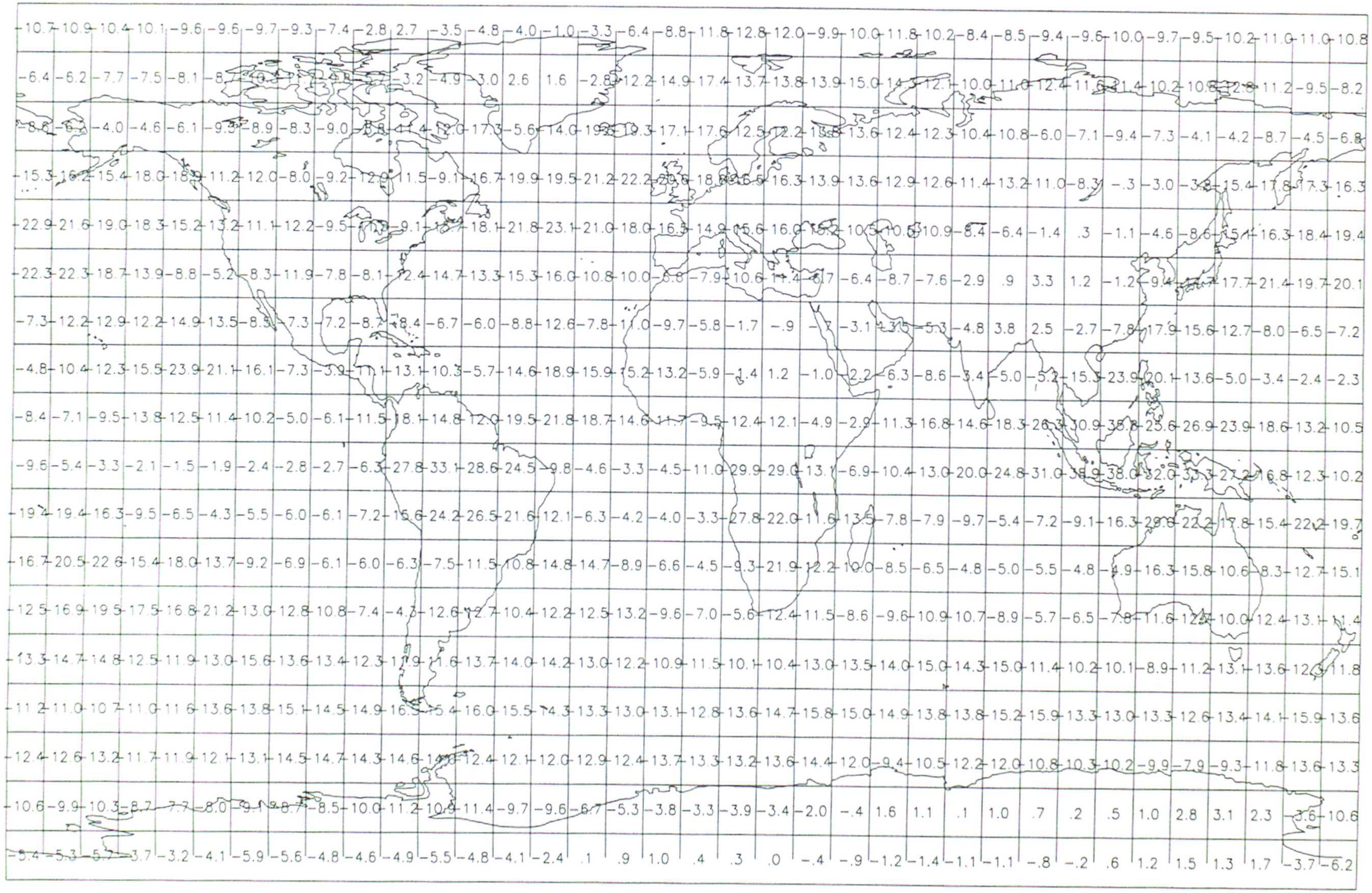
FIGURE 25



355	369	376	392	402	399	400	392	391	389	384	379	380	375	397	427	428	412	391	372	352	334	326	314	295	292	291	290	291	294	300	306	311	321	328	343
1000	1071	1119	1154	1152	1140	1128	1109	1105	1111	1126	1175	1272	1362	1436	1373	1271	1162	1035	917	818	779	752	780	814	841	871	894	893	880	857	833	820	825	858	929
737	901	1017	1063	1043	1003	978	940	900	897	1001	1173	1290	1318	1247	1132	1029	899	748	614	628	542	624	728	803	847	881	911	911	903	865	801	714	631	579	622
547	668	837	932	922	921	903	860	825	808	811	886	953	993	1010	988	911	800	665	502	443	569	762	824	778	780	825	840	804	779	827	843	734	561	478	489
532	582	747	898	890	947	1025	956	876	829	792	867	950	934	931	913	822	746	627	483	459	634	812	854	783	734	770	798	772	725	782	875	799	559	448	496
743	839	861	1085	1081	1026	1115	1026	956	867	718	843	954	918	925	897	773	701	579	469	456	722	883	843	783	716	771	804	706	711	777	832	849	553	441	539
735	920	892	1076	1017	827	936	900	910	847	684	848	929	916	892	877	743	644	539	487	504	808	905	811	775	699	793	865	668	714	766	814	852	545	461	528
646	924	911	970	962	824	840	790	873	844	725	865	951	926	831	858	753	583	520	519	609	850	885	781	778	659	696	828	644	701	725	778	854	573	483	505
593	886	936	931	972	890	840	812	941	994	979	1033	921	750	754	848	736	538	497	527	688	847	835	731	759	686	702	785	841	667	724	766	827	645	520	504
555	801	928	928	967	902	803	847	870	786	826	813	773	705	696	805	709	506	497	549	771	885	824	721	717	711	705	717	638	643	752	789	787	862	518	503
542	735	946	916	950	914	744	813	807	712	790	760	755	715	683	785	679	485	485	595	863	883	808	728	704	751	702	623	648	664	771	757	696	716	567	523
533	682	929	897	918	913	775	863	786	744	833	772	733	699	678	766	646	467	459	644	937	938	812	781	757	795	676	551	659	697	782	728	674	808	649	530
521	622	828	896	931	877	769	819	761	771	830	766	745	721	687	669	590	481	474	720	969	936	858	825	792	813	706	573	632	708	765	738	715	852	721	545
530	571	745	888	934	877	791	736	713	797	837	791	746	743	703	598	539	505	552	792	996	964	861	820	809	790	696	604	666	795	803	718	731	867	808	619
594	552	662	823	917	893	815	756	773	863	902	837	782	744	659	543	496	556	689	868	996	970	886	866	867	824	731	658	698	777	789	756	794	891	874	739
739	643	638	719	814	858	848	836	872	931	949	909	820	716	608	555	577	702	856	976	1030	999	964	949	935	887	824	783	786	799	812	836	885	951	948	862
897	835	790	775	786	813	832	856	876	882	889	864	834	799	778	799	840	915	991	1054	1089	1089	1091	1088	1069	1050	1031	1013	1022	1005	1015	1023	1033	1046	1025	970
328	319	313	300	296	295	289	296	291	295	297	302	305	308	311	320	333	334	352	361	373	382	384	385	385	387	383	384	379	381	379	374	372	362	354	341

ATOVS : MEAN O−B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)
DECEMBER 1999 : HIRS8 channel (Surface)
NOAA−15, USING ALL OBSERVATIONS

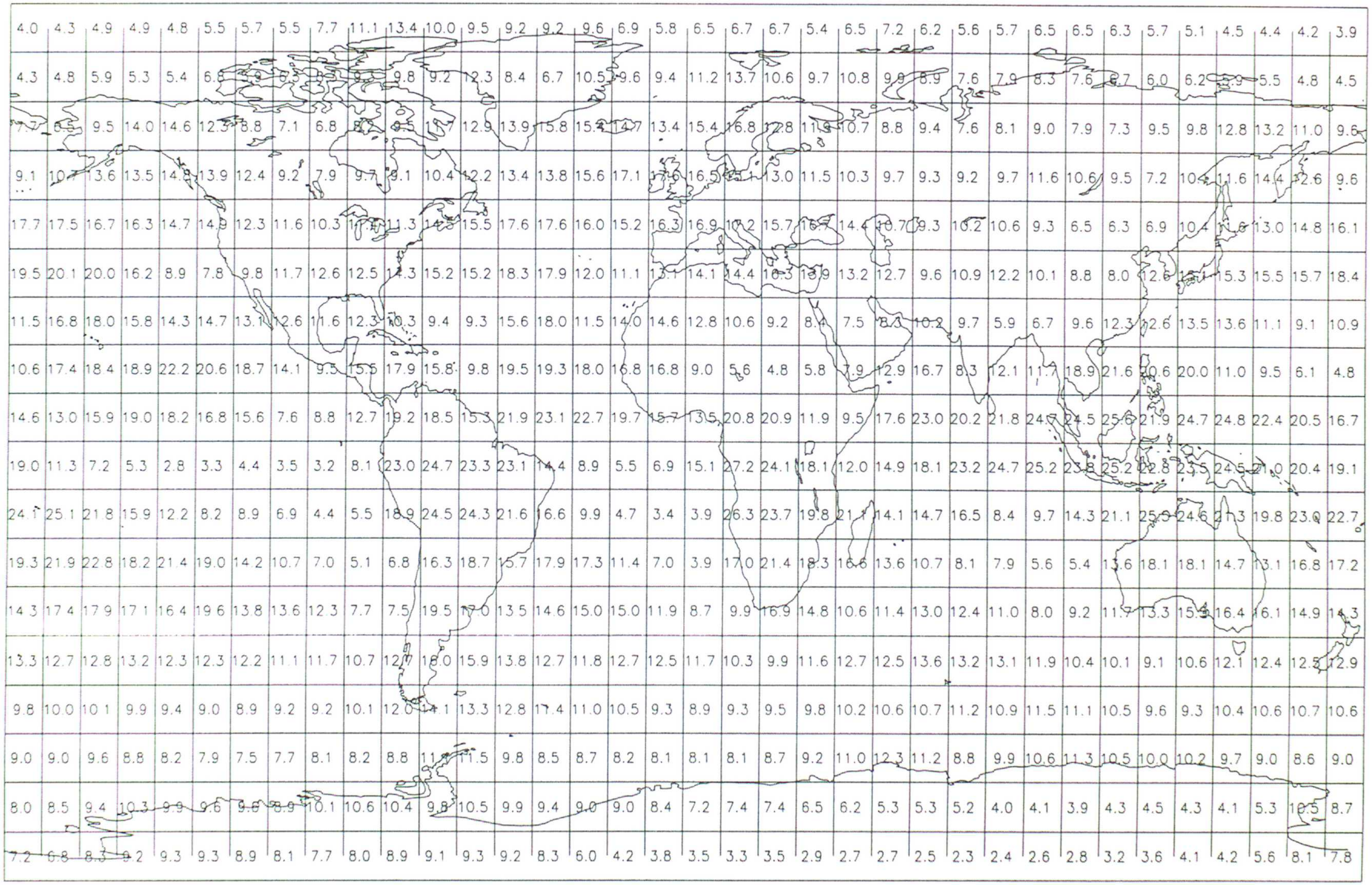
FIGURE 26


-10.7 -10.9 -10.4 -10.1 -9.6 -9.6 -9.7 -9.3 -7.4 -2.8 2.7 -3.5 -4.8 -4.0 -1.0 -3.3 -6.4 -8.8 -11.8 -12.8 -12.0 -9.9 -10.0 -11.8 -10.2 -8.4 -8.5 -9.4 -9.6 -10.0 -9.7 -9.5 -10.2 -11.0 -11.0 -10.8
-6.4 -6.2 -7.7 -7.5 -8.1 -8.7 -3.2 -4.9 -3.0 2.6 1.6 -2.8 -12.2 -14.9 -17.4 -13.7 -13.8 -13.9 -15.0 -14.3 -12.1 -10.0 -11.0 -12.4 -11.6 -11.4 -10.2 -10.8 -12.8 -11.2 -9.5 -8.2
-8.6 -6.3 -4.0 -4.6 -6.1 -9.3 -8.9 -8.3 -9.0 -8.8 -11.4 -12.0 -17.3 -5.6 -14.0 -19.3 -19.3 -17.1 -17.6 -12.5 -12.2 -13.8 -13.6 -12.4 -12.3 -10.4 -10.8 -6.0 -7.1 -9.4 -7.3 -4.1 -4.2 -8.7 -4.5 -6.8
-15.3 -16.2 -15.4 -18.0 -18.9 -11.2 -12.0 -8.0 -9.2 -12.0 -11.5 -9.1 -16.7 -19.9 -19.5 -21.2 -22.2 -20.6 -18.8 -16.5 -16.3 -13.9 -13.6 -12.9 -12.6 -11.4 -13.2 -11.0 -8.3 -.3 -3.0 -3.8 -15.4 -17.8 -17.3 -16.3
-22.9 -21.6 -19.0 -18.3 -15.2 -13.2 -11.1 -12.2 -9.5 -11.3 -9.1 -16.7 -18.1 -21.8 -23.1 -21.0 -18.0 -16.5 -14.9 -15.6 -16.0 -15.2 -10.5 -10.5 -10.9 -8.4 -6.4 -1.4 .3 -1.1 -4.6 -8.6 -15.1 -16.3 -18.4 -19.4
-22.3 -22.3 -18.7 -13.9 -8.8 -5.2 -8.3 -11.9 -7.8 -8.1 -12.4 -14.7 -13.3 -15.3 -16.0 -10.8 -10.0 -6.8 -7.9 -10.6 -11.4 -6.7 -6.4 -8.7 -7.6 -2.9 .9 3.3 1.2 -1.2 -9.4 -14.7 -17.7 -21.4 -19.7 -20.1
-7.3 -12.2 -12.9 -12.2 -14.9 -13.5 -8.5 -7.3 -7.2 -8.7 -8.4 -6.7 -6.0 -8.8 -12.6 -7.8 -11.0 -9.7 -5.8 -1.7 -.9 -.7 -3.1 -3.5 -5.3 -4.8 3.8 2.5 -2.7 -7.8 -17.9 -15.6 -12.7 -8.0 -6.5 -7.2
-4.8 -10.4 -12.3 -15.5 -23.9 -21.1 -16.1 -7.3 -3.9 -11.1 -13.1 -10.3 -5.7 -14.6 -18.9 -15.9 -15.2 -13.2 -5.9 -1.4 1.2 -1.0 -2.2 -6.3 -8.6 -3.4 -5.0 -5.2 -15.3 -23.9 -20.1 -13.6 -5.0 -3.4 -2.4 -2.3
-8.4 -7.1 -9.5 -13.8 -12.5 -11.4 -10.2 -5.0 -6.1 -11.5 -18.1 -14.8 -12.0 -19.5 -21.8 -18.7 -14.6 -11.7 -9.5 -12.4 -12.1 -4.9 -2.9 -11.3 -16.8 -14.6 -18.3 -26.3 -30.9 -35.8 -25.6 -26.9 -23.9 -18.6 -13.2 -10.5
-9.6 -5.4 -3.3 -2.1 -1.5 -1.9 -2.4 -2.8 -2.7 -6.3 -27.8 -33.1 -28.6 -24.5 -9.8 -4.6 -3.3 -4.5 -11.0 -29.9 -29.0 -13.1 -6.9 -10.4 -13.0 -20.0 -24.8 -31.0 -38.9 -38.0 -32.0 -31.3 -27.2 -16.8 -12.3 -10.2
-19.4 -19.4 -16.3 -9.5 -6.5 -4.3 -5.5 -6.0 -6.1 -7.2 -15.6 -24.2 -26.5 -21.6 -12.1 -6.3 -4.2 -4.0 -3.3 -27.8 -22.0 -11.6 -13.5 -7.8 -7.9 -9.7 -5.4 -7.2 -9.1 -16.3 -29.6 -22.2 -17.8 -15.4 -22.2 -19.7
-16.7 -20.5 -22.6 -15.4 -18.0 -13.7 -9.2 -6.9 -6.1 -6.0 -6.3 -7.5 -11.5 -10.8 -14.8 -14.7 -8.9 -6.6 -4.5 -9.3 -21.9 -12.2 -10.0 -8.5 -6.5 -4.8 -5.0 -5.5 -4.8 -4.9 -16.3 -15.8 -10.6 -8.3 -12.7 -15.1
-12.5 -16.9 -19.5 -17.5 -16.8 -21.2 -13.0 -12.8 -10.8 -7.4 -4.3 -12.6 -12.7 -10.4 -12.2 -12.5 -13.2 -9.6 -7.0 -5.6 -12.4 -11.5 -8.6 -9.6 -10.9 -10.7 -8.9 -5.7 -6.5 -7.8 -11.6 -12.4 -10.0 -12.4 -13.1 -11.4
-13.3 -14.7 -14.8 -12.5 -11.9 -13.0 -15.6 -13.6 -13.4 -12.3 -11.9 -11.6 -13.7 -14.0 -14.2 -13.0 -12.2 -10.9 -11.5 -10.1 -10.4 -13.0 -13.5 -14.0 -15.0 -14.3 -15.0 -11.4 -10.2 -10.1 -8.9 -11.2 -13.1 -13.6 -12.3 -11.8
-11.2 -11.0 -10.7 -11.0 -11.6 -13.6 -13.8 -15.1 -14.5 -14.9 -16.3 -15.4 -16.0 -15.5 -14.3 -13.3 -13.0 -13.1 -12.8 -13.6 -14.7 -15.8 -15.0 -14.9 -13.8 -13.8 -15.2 -15.9 -13.3 -13.0 -13.3 -12.6 -13.4 -14.1 -15.9 -13.6
-12.4 -12.6 -13.2 -11.7 -11.9 -12.1 -13.1 -14.5 -14.7 -14.3 -14.6 -14.9 -12.4 -12.1 -12.0 -12.9 -12.4 -13.7 -13.3 -13.2 -13.6 -14.4 -12.0 -9.4 -10.5 -12.2 -12.0 -10.8 -10.3 -10.2 -9.9 -7.9 -9.3 -11.8 -13.6 -13.3
-10.6 -9.9 -10.3 -8.7 -7.7 -8.0 -9.1 -8.7 -8.5 -10.0 -11.2 -10.9 -11.4 -9.7 -9.6 -6.7 -5.3 -3.8 -3.3 -3.9 -3.4 -2.0 -.4 1.6 1.1 .1 1.0 .7 .2 .5 1.0 2.8 3.1 2.3 -3.6 -10.6
-5.4 -5.3 -5.7 -3.7 -3.2 -4.1 -5.9 -5.6 -4.8 -4.6 -4.9 -5.5 -4.8 -4.1 -2.4 .1 .9 1.0 .4 .3 .0 -.4 -.9 -1.2 -1.4 -1.1 -1.1 -.8 -.2 .6 1.2 1.5 1.3 1.7 -3.7 -6.2

ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)

FIGURE 27

DECEMBER 1999 : HIRS8 channel (Surface)
NOAA-15, USING ALL OBSERVATIONS

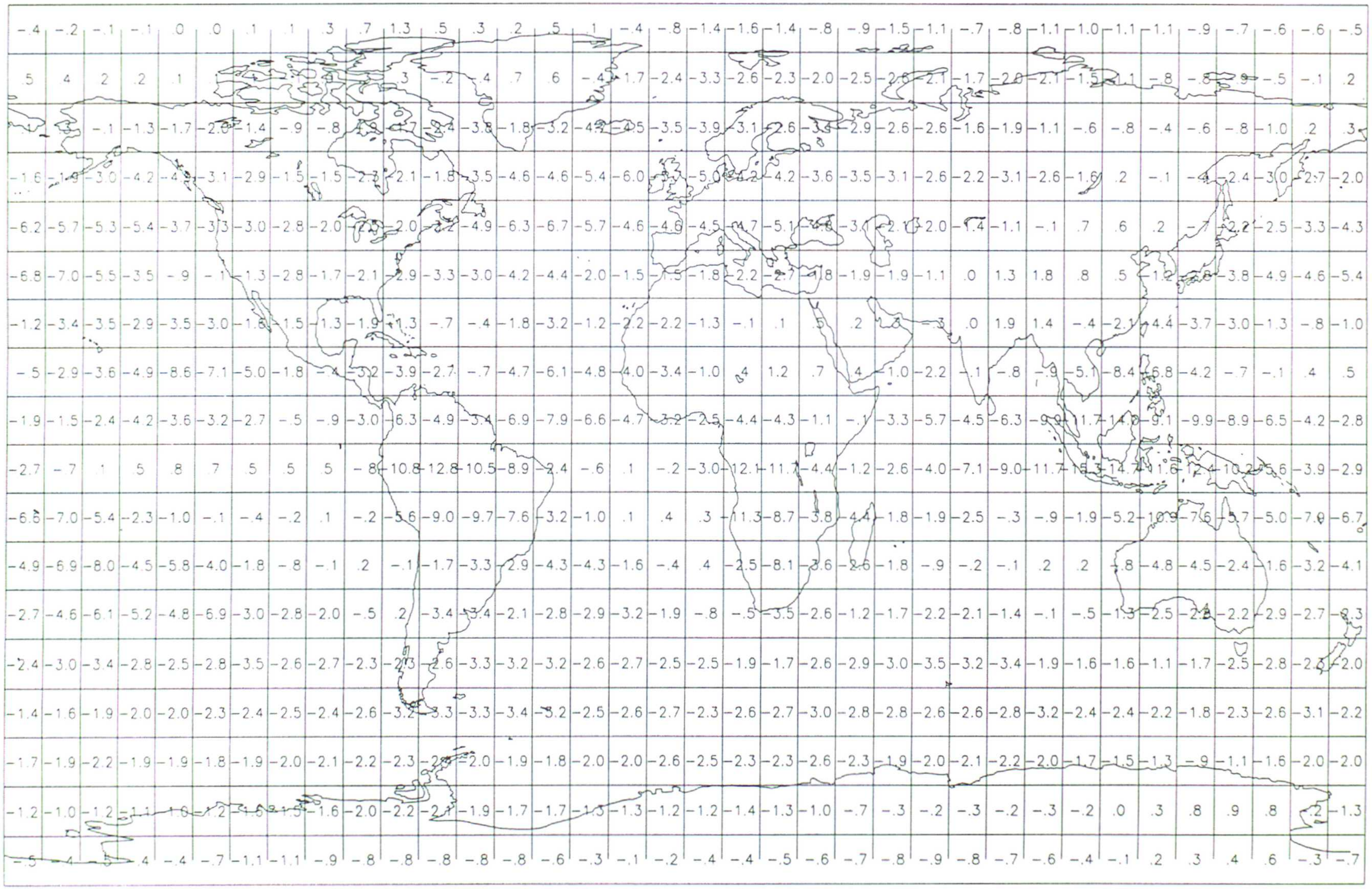


4.0	4.3	4.9	4.9	4.8	5.5	5.7	5.5	7.7	11.1	13.4	10.0	9.5	9.2	9.2	9.6	6.9	5.8	6.5	6.7	6.7	5.4	6.5	7.2	6.2	5.6	5.7	6.5	6.5	6.3	5.7	5.1	4.5	4.4	4.2	3.9
4.3	4.8	5.9	5.3	5.4	6.8	[illegible]	6.3	[illegible]	[illegible]	9.8	9.2	12.3	8.4	6.7	10.5	9.6	9.4	11.2	13.7	10.6	9.7	10.8	9.9	8.9	7.6	7.9	8.3	7.6	6.7	6.0	6.2	5.9	5.5	4.8	4.5
7.7	6.5	9.5	14.0	14.6	12.3	8.8	7.1	6.8	8.2	9.5	11.7	12.9	13.9	15.8	15.4	14.7	13.4	15.4	16.8	12.8	11.9	10.7	8.8	9.4	7.6	8.1	9.0	7.9	7.3	9.5	9.8	12.8	13.2	11.0	9.6
9.1	10.7	13.6	13.5	14.8	13.9	12.4	9.2	7.9	9.7	9.1	10.4	12.2	13.4	13.8	15.6	17.1	17.6	16.5	15.1	13.0	11.5	10.3	9.7	9.3	9.2	9.7	11.6	10.6	9.5	7.2	10.4	11.6	14.4	12.6	9.6
17.7	17.5	16.7	16.3	14.7	14.9	12.3	11.6	10.3	[illegible]	11.3	14.5	15.5	17.6	17.6	16.0	15.2	16.3	16.9	10.2	15.7	16.7	14.4	10.7	9.3	10.2	10.6	9.3	6.5	6.3	6.9	10.4	11.6	13.0	14.8	16.1
19.5	20.1	20.0	16.2	8.9	7.8	9.8	11.7	12.6	12.5	14.3	15.2	15.2	18.3	17.9	12.0	11.1	13.1	14.1	14.4	16.3	13.9	13.2	12.7	9.6	10.9	12.2	10.1	8.8	8.0	12.6	15.1	15.3	15.5	15.7	18.4
11.5	16.8	18.0	15.8	14.3	14.7	13.1	12.6	11.6	12.3	10.3	9.4	9.3	15.6	18.0	11.5	14.0	14.6	12.8	10.6	9.2	8.4	7.5	8.3	10.2	9.7	5.9	6.7	9.6	12.3	12.6	13.5	13.6	11.1	9.1	10.9
10.6	17.4	18.4	18.9	22.2	20.6	18.7	14.1	9.5	15.5	17.9	15.8	9.8	19.5	19.3	18.0	16.8	16.8	9.0	5.6	4.8	5.8	7.9	12.9	16.7	8.3	12.1	11.7	18.9	21.6	20.6	20.0	11.0	9.5	6.1	4.8
14.6	13.0	15.9	19.0	18.2	16.8	15.6	7.6	8.8	12.7	19.2	18.5	15.3	21.9	23.1	22.7	19.7	15.7	13.5	20.8	20.9	11.9	9.5	17.6	23.0	20.2	21.8	24.7	24.5	25.6	21.9	24.7	24.8	22.4	20.5	16.7
19.0	11.3	7.2	5.3	2.8	3.3	4.4	3.5	3.2	8.1	23.0	24.7	23.3	23.1	14.4	8.9	5.5	6.9	15.1	27.2	24.1	18.1	12.0	14.9	18.1	23.2	24.7	25.2	23.8	25.2	22.8	23.5	24.5	21.0	20.4	19.1
24.1	25.1	21.8	15.9	12.2	8.2	8.9	6.9	4.4	5.5	18.9	24.5	24.3	21.6	16.6	9.9	4.7	3.4	3.9	26.3	23.7	19.8	21.1	14.1	14.7	16.5	8.4	9.7	14.3	21.1	25.5	24.6	21.3	19.8	23.0	22.7
19.3	21.9	22.8	18.2	21.4	19.0	14.2	10.7	7.0	5.1	6.8	16.3	18.7	15.7	17.9	17.3	11.4	7.0	3.9	17.0	21.4	18.3	16.6	13.6	10.7	8.1	7.9	5.6	5.4	13.6	18.1	18.1	14.7	13.1	16.8	17.2
14.3	17.4	17.9	17.1	16.4	19.6	13.8	13.6	12.3	7.7	7.5	19.5	17.0	13.5	14.6	15.0	15.0	11.9	8.7	9.9	16.9	14.8	10.6	11.4	13.0	12.4	11.0	8.0	9.2	11.7	13.3	15.5	16.4	16.1	14.9	14.3
13.3	12.7	12.8	13.2	12.3	12.3	12.2	11.1	11.7	10.7	12.7	18.0	15.9	13.8	12.7	11.8	12.7	12.5	11.7	10.3	9.9	11.6	12.7	12.5	13.6	13.2	13.1	11.9	10.4	10.1	9.1	10.6	12.1	12.4	12.5	12.9
9.8	10.0	10.1	9.9	9.4	9.0	8.9	9.2	9.2	10.1	12.0	14.1	13.3	12.8	17.4	11.0	10.5	9.3	8.9	9.3	9.5	9.8	10.2	10.6	10.7	11.2	10.9	11.5	11.1	10.5	9.6	9.3	10.4	10.6	10.7	10.6
9.0	9.0	9.6	8.8	8.2	7.9	7.5	7.7	8.1	8.2	8.8	[illegible]	11.5	9.8	8.5	8.7	8.2	8.1	8.1	8.1	8.7	9.2	11.0	12.3	11.2	8.8	9.9	10.6	11.3	10.5	10.0	10.2	9.7	9.0	8.6	9.0
8.0	8.5	9.4	10.3	9.9	9.6	9.6	8.9	10.1	10.6	10.4	9.8	10.5	9.9	9.4	9.0	9.0	8.4	7.2	7.4	7.4	6.5	6.2	5.3	5.3	5.2	4.0	4.1	3.9	4.3	4.5	4.3	4.1	5.3	10.5	8.7
7.2	6.8	8.3	9.2	9.3	9.3	8.9	8.1	7.7	8.0	8.9	9.1	9.3	9.2	8.3	6.0	4.2	3.8	3.5	3.3	3.5	2.9	2.7	2.7	2.5	2.3	2.4	2.6	2.8	3.2	3.6	4.1	4.2	5.6	8.1	7.8

ATOVS : MEAN O–B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)

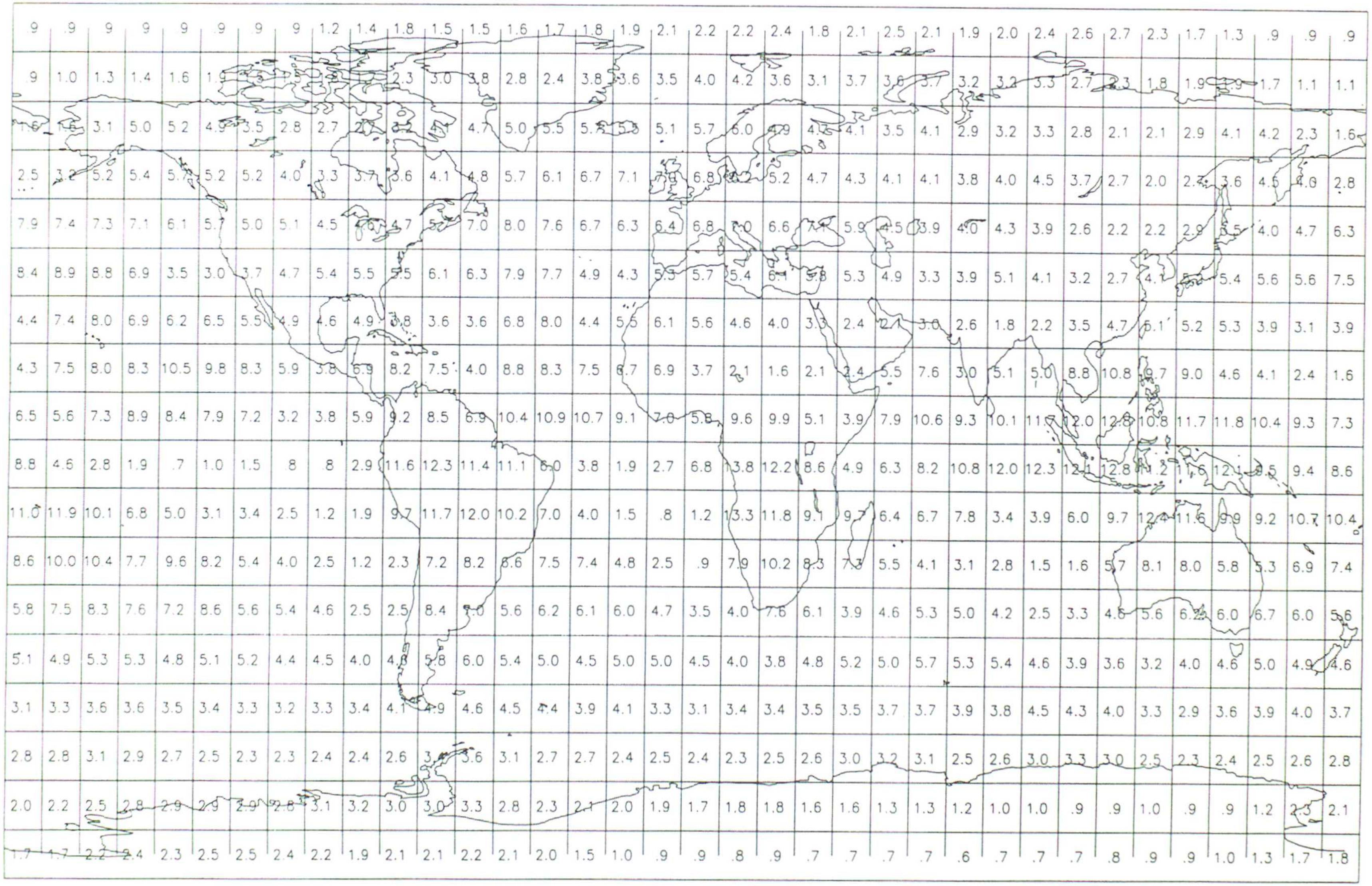
FIGURE 28

DECEMBER 1999 : HIRS15 Channel (700 hPa)
NOAA–15, USING ALL OBSERVATIONS


-.4 -.2 -.1 -.1 .0 .0 .1 .1 .3 .7 1.3 .5 .3 .2 .5 .1 -.4 -.8 -1.4 -1.6 -1.4 -.8 -.9 -1.5 -1.1 -.7 -.8 -1.1 -1.0 -1.1 -1.1 -.9 -.7 -.6 -.6 -.5
.5 .4 .2 .2 .1 .3 -.2 -.4 .7 .6 -.4 -1.7 -2.4 -3.3 -2.6 -2.3 -2.0 -2.5 -2.6 -2.1 -1.7 -2.0 -2.1 -1.5 -1.1 -.8 -.8 -.9 -.5 -.1 .2
-.1 -1.3 -1.7 -2.0 -1.4 -.9 -.8 -1.7 -2.4 -3.8 -1.8 -3.2 -4.2 -4.5 -3.5 -3.9 -3.1 -2.6 -3.3 -2.9 -2.6 -2.6 -1.6 -1.9 -1.1 -.6 -.8 -.4 -.6 -.8 -1.0 .2 .3
-1.6 -1.9 -3.0 -4.2 -4.3 -3.1 -2.9 -1.5 -1.5 -2.3 -2.1 -1.8 -3.5 -4.6 -4.6 -5.4 -6.0 -5.0 -4.2 -4.2 -3.6 -3.5 -3.1 -2.6 -2.2 -3.1 -2.6 -1.6 .2 -.1 -.4 -2.4 -3.0 -2.7 -2.0
-6.2 -5.7 -5.3 -5.4 -3.7 -3.3 -3.0 -2.8 -2.0 -2.5 -2.0 -2.2 -4.9 -6.3 -6.7 -5.7 -4.6 -4.6 -4.5 -4.7 -5.1 -4.8 -3.1 -2.1 -2.0 -1.4 -1.1 -.1 .7 .6 .2 -.7 -2.2 -2.5 -3.3 -4.3
-6.8 -7.0 -5.5 -3.5 -.9 -.1 -1.3 -2.8 -1.7 -2.1 -2.9 -3.3 -3.0 -4.2 -4.4 -2.0 -1.5 -1.5 -1.8 -2.2 -2.7 -1.8 -1.9 -1.9 -1.1 .0 1.3 1.8 .8 .5 -1.2 -2.8 -3.8 -4.9 -4.6 -5.4
-1.2 -3.4 -3.5 -2.9 -3.5 -3.0 -1.6 -1.5 -1.3 -1.9 -1.3 -.7 -.4 -1.8 -3.2 -1.2 -2.2 -2.2 -1.3 -.1 .1 .5 .2 -.3 -.3 .0 1.9 1.4 -.4 -2.1 -4.4 -3.7 -3.0 -1.3 -.8 -1.0
-.5 -2.9 -3.6 -4.9 -8.6 -7.1 -5.0 -1.8 -.4 -3.2 -3.9 -2.7 -.7 -4.7 -6.1 -4.8 -4.0 -3.4 -1.0 .4 1.2 .7 .4 -1.0 -2.2 -.1 -.8 -.9 -5.1 -8.4 -6.8 -4.2 -.7 -.1 .4 .5
-1.9 -1.5 -2.4 -4.2 -3.6 -3.2 -2.7 -.5 -.9 -3.0 -6.3 -4.9 -3.4 -6.9 -7.9 -6.6 -4.7 -3.2 -2.5 -4.4 -4.3 -1.1 -.1 -3.3 -5.7 -4.5 -6.3 -9.9 -11.7 -14.0 -9.1 -9.9 -8.9 -6.5 -4.2 -2.8
-2.7 -.7 .1 .5 .8 .7 .5 .5 .5 -.8 -10.8 -12.8 -10.5 -8.9 -2.4 -.6 .1 -.2 -3.0 -12.1 -11.7 -4.4 -1.2 -2.6 -4.0 -7.1 -9.0 -11.7 -15.3 -14.7 -11.6 -12.4 -10.2 -5.6 -3.9 -2.9
-6.6 -7.0 -5.4 -2.3 -1.0 -.1 -.4 -.2 .1 -.2 -5.6 -9.0 -9.7 -7.6 -3.2 -1.0 .1 .4 .3 -11.3 -8.7 -3.8 -4.4 -1.8 -1.9 -2.5 -.3 -.9 -1.9 -5.2 -10.9 -7.6 -5.7 -5.0 -7.0 -6.7
-4.9 -6.9 -8.0 -4.5 -5.8 -4.0 -1.8 -.8 -.1 .2 -.1 -1.7 -3.3 -2.9 -4.3 -4.3 -1.6 -.4 .4 -2.5 -8.1 -3.6 -2.6 -1.8 -.9 -.2 -.1 .2 .2 -.8 -4.8 -4.5 -2.4 -1.6 -3.2 -4.1
-2.7 -4.6 -6.1 -5.2 -4.8 -6.9 -3.0 -2.8 -2.0 -.5 .2 -3.4 -3.4 -2.1 -2.8 -2.9 -3.2 -1.9 -.8 -.5 -3.5 -2.6 -1.2 -1.7 -2.2 -2.1 -1.4 -.1 -.5 -1.3 -2.5 -2.3 -2.2 -2.9 -2.7 -3.3
-2.4 -3.0 -3.4 -2.8 -2.5 -2.8 -3.5 -2.6 -2.7 -2.3 -2.3 -2.6 -3.3 -3.2 -3.2 -2.6 -2.7 -2.5 -2.5 -1.9 -1.7 -2.6 -2.9 -3.0 -3.5 -3.2 -3.4 -1.9 -1.6 -1.6 -1.1 -1.7 -2.5 -2.8 -2.3 -2.0
-1.4 -1.6 -1.9 -2.0 -2.0 -2.3 -2.4 -2.5 -2.4 -2.6 -3.2 -3.3 -3.3 -3.4 -3.2 -2.5 -2.6 -2.7 -2.3 -2.6 -2.7 -3.0 -2.8 -2.8 -2.6 -2.6 -2.8 -3.2 -2.4 -2.4 -2.2 -1.8 -2.3 -2.6 -3.1 -2.2
-1.7 -1.9 -2.2 -1.9 -1.9 -1.8 -1.9 -2.0 -2.1 -2.2 -2.3 -2.0 -2.0 -1.9 -1.8 -2.0 -2.0 -2.6 -2.5 -2.3 -2.3 -2.6 -2.3 -1.9 -2.0 -2.1 -2.2 -2.0 -1.7 -1.5 -1.3 -.9 -1.1 -1.6 -2.0 -2.0
-1.2 -1.0 -1.2 -1.1 -1.6 -1.2 -1.5 -1.5 -1.6 -2.0 -2.2 -2.1 -1.9 -1.7 -1.7 -1.3 -1.3 -1.2 -1.2 -1.4 -1.3 -1.0 -.7 -.3 -.2 -.3 -.2 -.3 -.2 .0 .3 .8 .9 .8 -.2 -1.3
-.5 -.4 -.5 .4 -.4 -.7 -1.1 -1.1 -.9 -.8 -.8 -.8 -.8 -.8 -.6 -.3 -.1 -.2 -.4 -.4 -.5 -.6 -.7 -.8 -.9 -.8 -.7 -.6 -.4 -.1 .2 .3 .4 .6 -.3 -.7

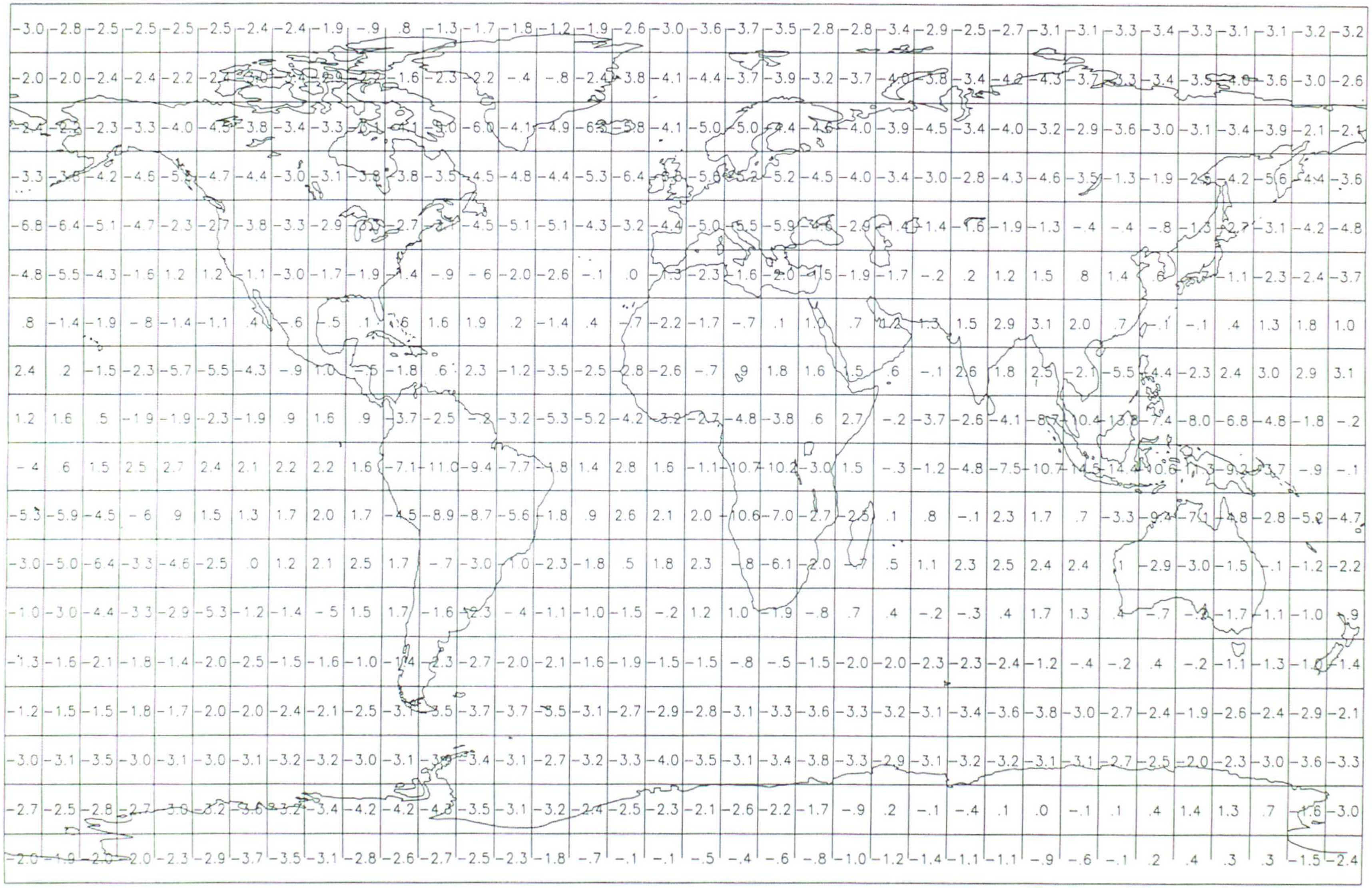
ATOVS : SD O–B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
DECEMBER 1999 : HIRS15 channel (700 hPa)
NOAA–15, USING ALL OBSERVATIONS

FIGURE 29



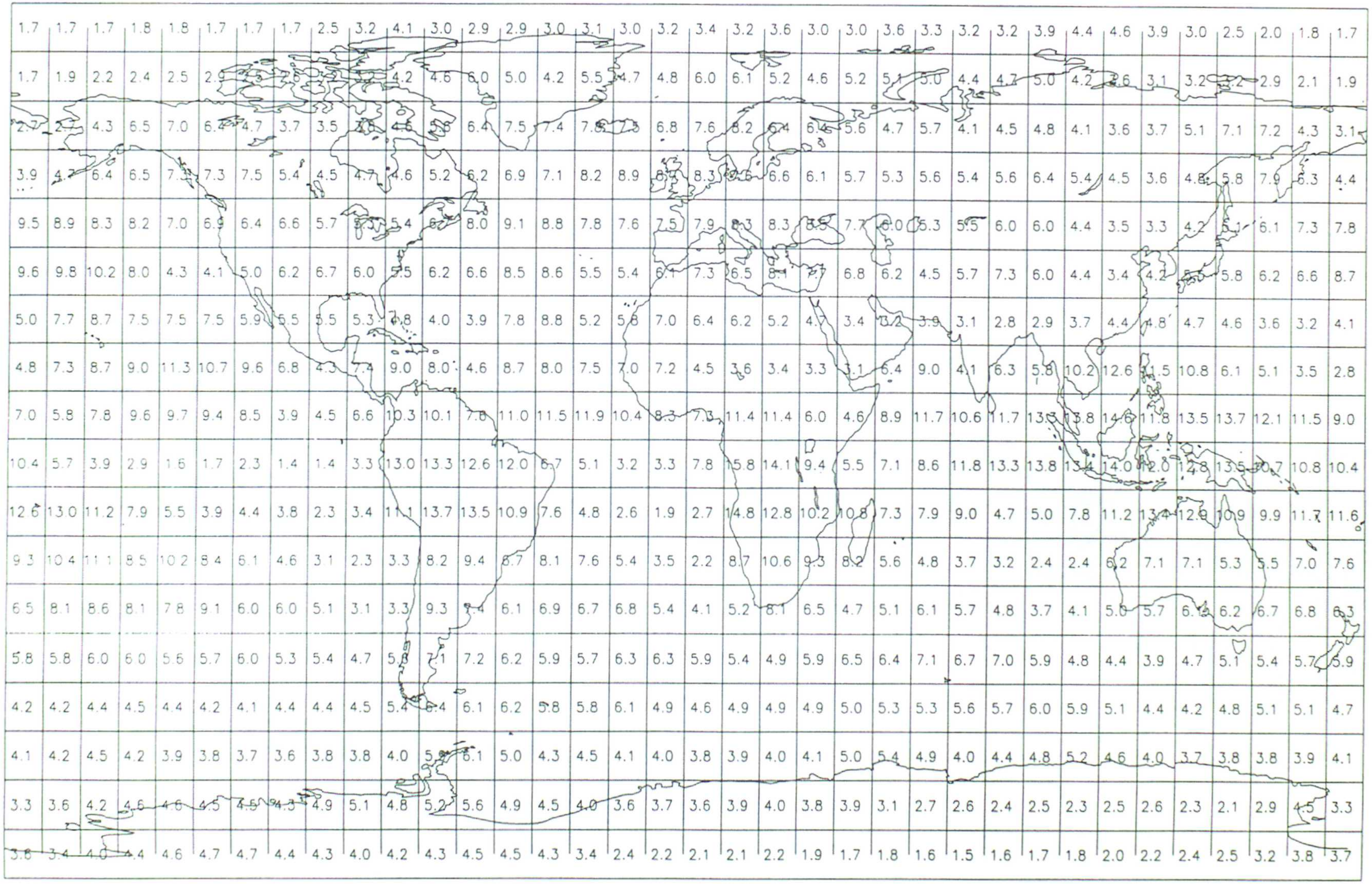
.9	.9	9	9	.9	.9	.9	9	1.2	1.4	1.8	1.5	1.5	1.6	1.7	1.8	1.9	2.1	2.2	2.2	2.4	1.8	2.1	2.5	2.1	1.9	2.0	2.4	2.6	2.7	2.3	1.7	1.3	.9	.9	.9
.9	1.0	1.3	1.4	1.6	1.9	[illegible]	1.5	[illegible]	[illegible]	2.3	3.0	3.8	2.8	2.4	3.8	3.6	3.5	4.0	4.2	3.6	3.1	3.7	3.6	3.7	3.2	3.2	3.3	2.7	2.3	1.8	1.9	1.9	1.7	1.1	1.1
1.6	1.6	3.1	5.0	5.2	4.9	3.5	2.8	2.7	2.7	3.2	4.1	4.7	5.0	5.5	5.8	5.3	5.1	5.7	6.0	4.9	4.7	4.1	3.5	4.1	2.9	3.2	3.3	2.8	2.1	2.1	2.9	4.1	4.2	2.3	1.6
2.5	3.2	5.2	5.4	5.7	5.2	5.2	4.0	3.3	3.7	3.6	4.1	4.8	5.7	6.1	6.7	7.1	7.0	6.8	6.2	5.2	4.7	4.3	4.1	4.1	3.8	4.0	4.5	3.7	2.7	2.0	2.7	3.6	4.5	4.0	2.8
7.9	7.4	7.3	7.1	6.1	5.7	5.0	5.1	4.5	4.6	4.7	5.7	7.0	8.0	7.6	6.7	6.3	6.4	6.8	7.0	6.6	7.1	5.9	4.5	3.9	4.0	4.3	3.9	2.6	2.2	2.2	2.9	3.5	4.0	4.7	6.3
8.4	8.9	8.8	6.9	3.5	3.0	3.7	4.7	5.4	5.5	5.5	6.1	6.3	7.9	7.7	4.9	4.3	5.3	5.7	5.4	6.1	5.8	5.3	4.9	3.3	3.9	5.1	4.1	3.2	2.7	4.1	5.2	5.4	5.6	5.6	7.5
4.4	7.4	8.0	6.9	6.2	6.5	5.5	4.9	4.6	4.9	3.8	3.6	3.6	6.8	8.0	4.4	5.5	6.1	5.6	4.6	4.0	3.3	2.4	2.1	3.0	2.6	1.8	2.2	3.5	4.7	5.1	5.2	5.3	3.9	3.1	3.9
4.3	7.5	8.0	8.3	10.5	9.8	8.3	5.9	3.8	6.9	8.2	7.5	4.0	8.8	8.3	7.5	6.7	6.9	3.7	2.1	1.6	2.1	2.4	5.5	7.6	3.0	5.1	5.0	8.8	10.8	9.7	9.0	4.6	4.1	2.4	1.6
6.5	5.6	7.3	8.9	8.4	7.9	7.2	3.2	3.8	5.9	9.2	8.5	6.9	10.4	10.9	10.7	9.1	7.0	5.8	9.6	9.9	5.1	3.9	7.9	10.6	9.3	10.1	11.7	12.0	12.8	10.8	11.7	11.8	10.4	9.3	7.3
8.8	4.6	2.8	1.9	.7	1.0	1.5	.8	.8	2.9	11.6	12.3	11.4	11.1	6.0	3.8	1.9	2.7	6.8	13.8	12.2	8.6	4.9	6.3	8.2	10.8	12.0	12.3	12.1	12.8	11.2	11.6	12.1	9.5	9.4	8.6
11.0	11.9	10.1	6.8	5.0	3.1	3.4	2.5	1.2	1.9	9.7	11.7	12.0	10.2	7.0	4.0	1.5	.8	1.2	13.3	11.8	9.1	9.7	6.4	6.7	7.8	3.4	3.9	6.0	9.7	12.4	11.6	9.9	9.2	10.7	10.4
8.6	10.0	10.4	7.7	9.6	8.2	5.4	4.0	2.5	1.2	2.3	7.2	8.2	8.6	7.5	7.4	4.8	2.5	.9	7.9	10.2	8.3	7.3	5.5	4.1	3.1	2.8	1.5	1.6	5.7	8.1	8.0	5.8	5.3	6.9	7.4
5.8	7.5	8.3	7.6	7.2	8.6	5.6	5.4	4.6	2.5	2.5	8.4	7.0	5.6	6.2	6.1	6.0	4.7	3.5	4.0	7.6	6.1	3.9	4.6	5.3	5.0	4.2	2.5	3.3	4.6	5.6	6.2	6.0	6.7	6.0	5.6
5.1	4.9	5.3	5.3	4.8	5.1	5.2	4.4	4.5	4.0	4.8	5.8	6.0	5.4	5.0	4.5	5.0	5.0	4.5	4.0	3.8	4.8	5.2	5.0	5.7	5.3	5.4	4.6	3.9	3.6	3.2	4.0	4.6	5.0	4.9	4.6
3.1	3.3	3.6	3.6	3.5	3.4	3.3	3.2	3.3	3.4	4.1	4.9	4.6	4.5	4.4	3.9	4.1	3.3	3.1	3.4	3.4	3.5	3.5	3.7	3.7	3.9	3.8	4.5	4.3	4.0	3.3	2.9	3.6	3.9	4.0	3.7
2.8	2.8	3.1	2.9	2.7	2.5	2.3	2.3	2.4	2.4	2.6	3.4	3.6	3.1	2.7	2.7	2.4	2.5	2.4	2.3	2.5	2.6	3.0	3.2	3.1	2.5	2.6	3.0	3.3	3.0	2.5	2.3	2.4	2.5	2.6	2.8
2.0	2.2	2.5	2.8	2.9	2.9	2.9	2.8	3.1	3.2	3.0	3.0	3.3	2.8	2.3	2.1	2.0	1.9	1.7	1.8	1.8	1.6	1.6	1.3	1.3	1.2	1.0	1.0	.9	.9	1.0	.9	.9	1.2	2.3	2.1
1.7	1.7	2.2	2.4	2.3	2.5	2.5	2.4	2.2	1.9	2.1	2.1	2.2	2.1	2.0	1.5	1.0	.9	.9	.8	.9	.7	.7	.7	.7	.6	.7	.7	.7	.8	.9	.9	1.0	1.3	1.7	1.8

ATOVS : MEAN O-B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C) FIGURE 30
DECEMBER 1999 : HIRS11 Channel (500–700 hPa)
NOAA-15, USING ALL OBSERVATIONS


-3.0 -2.8 -2.5 -2.5 -2.5 -2.5 -2.4 -2.4 -1.9 -.9 .8 -1.3 -1.7 -1.8 -1.2 -1.9 -2.6 -3.0 -3.6 -3.7 -3.5 -2.8 -2.8 -3.4 -2.9 -2.5 -2.7 -3.1 -3.1 -3.3 -3.4 -3.3 -3.1 -3.1 -3.2 -3.2
-2.0 -2.0 -2.4 -2.4 -2.2 -2.4 -3.0 -3.4 -2.9 -2.2 -1.6 -2.3 -2.2 -.4 -.8 -2.4 -3.8 -4.1 -4.4 -3.7 -3.9 -3.2 -3.7 -4.0 -3.8 -3.4 -4.2 -4.3 -3.7 -3.3 -3.4 -3.5 -4.0 -3.6 -3.0 -2.6
-2.4 -2.2 -2.3 -3.3 -4.0 -4.5 -3.8 -3.4 -3.3 -3.1 -4.1 -3.0 -6.0 -4.1 -4.9 -6.3 -5.8 -4.1 -5.0 -5.0 -4.4 -4.6 -4.0 -3.9 -4.5 -3.4 -4.0 -3.2 -2.9 -3.6 -3.0 -3.1 -3.4 -3.9 -2.1 -2.1
-3.3 -3.8 -4.2 -4.6 -5.3 -4.7 -4.4 -3.0 -3.1 -3.8 -3.8 -3.5 -4.5 -4.8 -4.4 -5.3 -6.4 -5.8 -5.6 -5.2 -5.2 -4.5 -4.0 -3.4 -3.0 -2.8 -4.3 -4.6 -3.5 -1.3 -1.9 -2.5 -4.2 -5.6 -4.4 -3.6
-6.8 -6.4 -5.1 -4.7 -2.3 -2.7 -3.8 -3.3 -2.9 -3.3 -2.7 -3.1 -4.5 -5.1 -5.1 -4.3 -3.2 -4.4 -5.0 -5.5 -5.9 -4.6 -2.9 -1.4 -1.4 -1.6 -1.9 -1.3 -.4 -.4 -.8 -1.3 -2.7 -3.1 -4.2 -4.8
-4.8 -5.5 -4.3 -1.6 1.2 1.2 -1.1 -3.0 -1.7 -1.9 -1.4 -.9 -.6 -2.0 -2.6 -.1 .0 -1.3 -2.3 -1.6 -2.0 -1.5 -1.9 -1.7 -.2 .2 1.2 1.5 .8 1.4 .6 -.7 -1.1 -2.3 -2.4 -3.7
.8 -1.4 -1.9 -.8 -1.4 -1.1 .4 -.6 -.5 .1 .6 1.6 1.9 .2 -1.4 .4 -.7 -2.2 -1.7 -.7 .1 1.0 .7 1.2 1.3 1.5 2.9 3.1 2.0 .7 -.1 -.1 .4 1.3 1.8 1.0
2.4 .2 -1.5 -2.3 -5.7 -5.5 -4.3 -.9 1.0 -.5 -1.8 .6 2.3 -1.2 -3.5 -2.5 -2.8 -2.6 -.7 .9 1.8 1.6 1.5 .6 -.1 2.6 1.8 2.5 -2.1 -5.5 -4.4 -2.3 2.4 3.0 2.9 3.1
1.2 1.6 .5 -1.9 -1.9 -2.3 -1.9 .9 1.6 .9 -3.7 -2.5 -.2 -3.2 -5.3 -5.2 -4.2 -3.2 -2.7 -4.8 -3.8 .6 2.7 -.2 -3.7 -2.6 -4.1 -8.7 -10.4 -13.8 -7.4 -8.0 -6.8 -4.8 -1.8 -.2
-.4 .6 1.5 2.5 2.7 2.4 2.1 2.2 2.2 1.6 -7.1 -11.0 -9.4 -7.7 -1.8 1.4 2.8 1.6 -1.1 -10.7 -10.2 -3.0 1.5 -.3 -1.2 -4.8 -7.5 -10.7 -14.5 -14.4 -10.6 -11.3 -9.2 -3.7 -.9 -.1
-5.3 -5.9 -4.5 -.6 .9 1.5 1.3 1.7 2.0 1.7 -4.5 -8.9 -8.7 -5.6 -1.8 .9 2.6 2.1 2.0 -10.6 -7.0 -2.7 -2.5 .1 .8 -.1 2.3 1.7 .7 -3.3 -9.4 -7.1 -4.8 -2.8 -5.2 -4.7
-3.0 -5.0 -6.4 -3.3 -4.6 -2.5 .0 1.2 2.1 2.5 1.7 -.7 -3.0 -1.0 -2.3 -1.8 .5 1.8 2.3 -.8 -6.1 -2.0 -.7 .5 1.1 2.3 2.5 2.4 2.4 .1 -2.9 -3.0 -1.5 -.1 -1.2 -2.2
-1.0 -3.0 -4.4 -3.3 -2.9 -5.3 -1.2 -1.4 -.5 1.5 1.7 -1.6 -2.3 -.4 -1.1 -1.0 -1.5 -.2 1.2 1.0 -1.9 -.8 .7 .4 -.2 -.3 .4 1.7 1.3 .4 -.7 -.2 -1.7 -1.1 -1.0 .9
-1.3 -1.6 -2.1 -1.8 -1.4 -2.0 -2.5 -1.5 -1.6 -1.0 -1.4 -2.3 -2.7 -2.0 -2.1 -1.6 -1.9 -1.5 -1.5 -.8 -.5 -1.5 -2.0 -2.0 -2.3 -2.3 -2.4 -1.2 -.4 -.2 .4 -.2 -1.1 -1.3 -1.0 -1.4
-1.2 -1.5 -1.5 -1.8 -1.7 -2.0 -2.0 -2.4 -2.1 -2.5 -3.1 -3.5 -3.7 -3.7 -3.5 -3.1 -2.7 -2.9 -2.8 -3.1 -3.3 -3.6 -3.3 -3.2 -3.1 -3.4 -3.6 -3.8 -3.0 -2.7 -2.4 -1.9 -2.6 -2.4 -2.9 -2.1
-3.0 -3.1 -3.5 -3.0 -3.1 -3.0 -3.1 -3.2 -3.2 -3.0 -3.1 -3.9 -3.4 -3.1 -2.7 -3.2 -3.3 -4.0 -3.5 -3.1 -3.4 -3.8 -3.3 -2.9 -3.1 -3.2 -3.2 -3.1 -3.1 -2.7 -2.5 -2.0 -2.3 -3.0 -3.6 -3.3
-2.7 -2.5 -2.8 -2.7 -3.0 -3.2 -3.6 -3.2 -3.4 -4.2 -4.2 -4.3 -3.5 -3.1 -3.2 -2.4 -2.5 -2.3 -2.1 -2.6 -2.2 -1.7 -.9 .2 -.1 -.4 .1 .0 -.1 .1 .4 1.4 1.3 .7 -1.6 -3.0
-2.0 -1.9 -2.0 -2.0 -2.3 -2.9 -3.7 -3.5 -3.1 -2.8 -2.6 -2.7 -2.5 -2.3 -1.8 -.7 -.1 -.1 -.5 -.4 -.6 -.8 -1.0 -1.2 -1.4 -1.1 -1.1 -.9 -.6 -.1 .2 .4 .3 .3 -1.5 -2.4

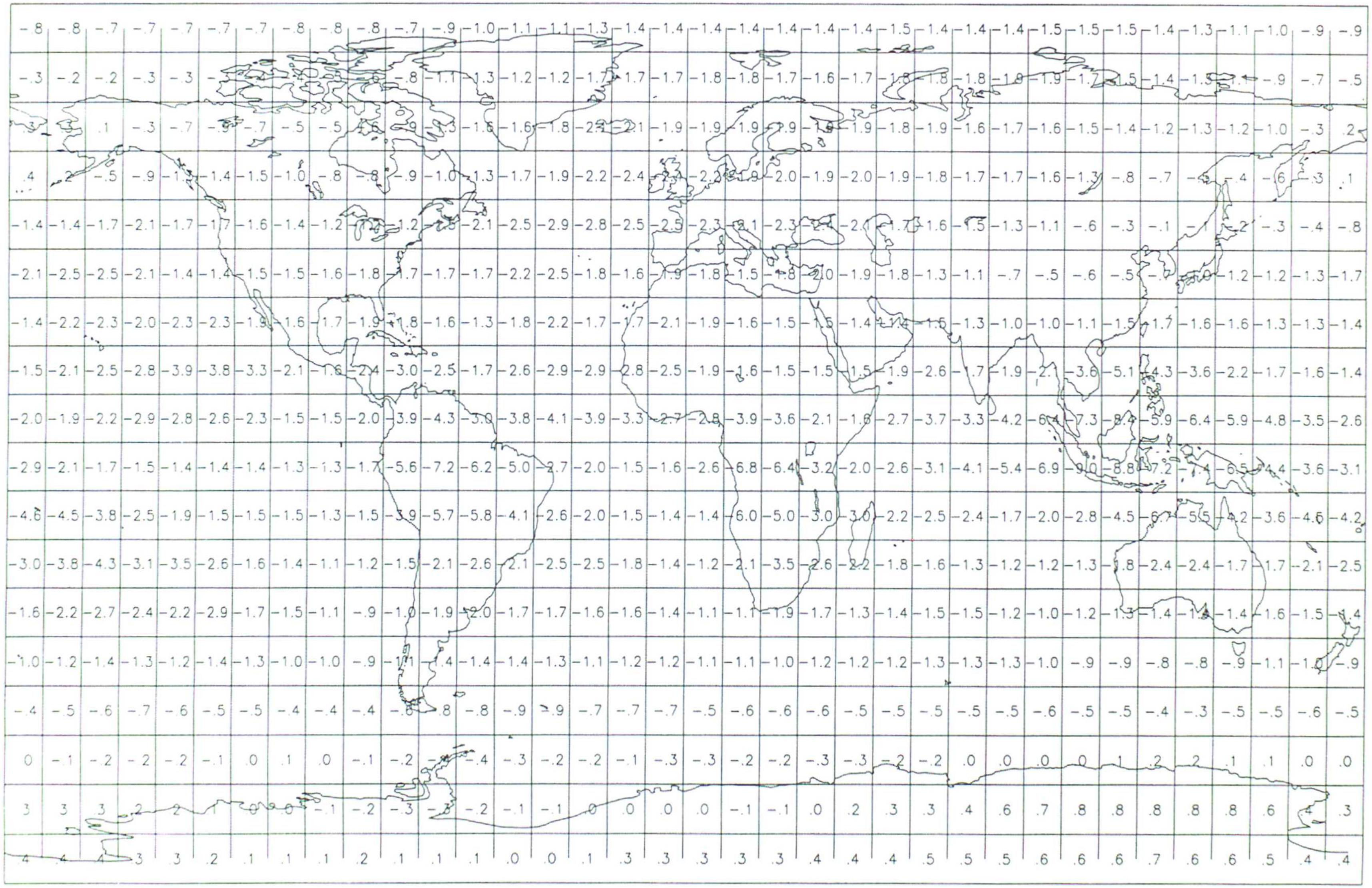
ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
DECEMBER 1999 : HIRS11 channel (500-700 hPa)
NOAA-15, USING ALL OBSERVATIONS

FIGURE 31


1.7 1.7 1.7 1.8 1.8 1.7 1.7 1.7 2.5 3.2 4.1 3.0 2.9 2.9 3.0 3.1 3.0 3.2 3.4 3.2 3.6 3.0 3.0 3.6 3.3 3.2 3.2 3.9 4.4 4.6 3.9 3.0 2.5 2.0 1.8 1.7
1.7 1.9 2.2 2.4 2.5 2.9 2.5 2.6 [illegible] [illegible] 4.2 4.6 6.0 5.0 4.2 5.5 4.7 4.8 6.0 6.1 5.2 4.6 5.2 5.1 5.0 4.4 4.7 5.0 4.2 2.6 3.1 3.2 3.2 2.9 2.1 1.9
2.7 2.7 4.3 6.5 7.0 6.4 4.7 3.7 3.5 3.6 4.6 5.8 6.4 7.5 7.4 7.8 7.5 6.8 7.6 8.2 6.4 6.4 5.6 4.7 5.7 4.1 4.5 4.8 4.1 3.6 3.7 5.1 7.1 7.2 4.3 3.1
3.9 4.7 6.4 6.5 7.3 7.3 7.5 5.4 4.5 4.7 4.6 5.2 6.2 6.9 7.1 8.2 8.9 8.4 8.3 [illegible] 6.6 6.1 5.7 5.3 5.6 5.4 5.6 6.4 5.4 4.5 3.6 4.8 5.8 7.9 6.3 4.4
9.5 8.9 8.3 8.2 7.0 6.9 6.4 6.6 5.7 5.3 5.4 [illegible] 8.0 9.1 8.8 7.8 7.6 7.5 7.9 8.3 8.3 8.5 7.7 6.0 5.3 5.5 6.0 6.0 4.4 3.5 3.3 4.2 5.1 6.1 7.3 7.8
9.6 9.8 10.2 8.0 4.3 4.1 5.0 6.2 6.7 6.0 5.5 6.2 6.6 8.5 8.6 5.5 5.4 6.1 7.3 6.5 8.1 7.7 6.8 6.2 4.5 5.7 7.3 6.0 4.4 3.4 4.2 5.5 5.8 6.2 6.6 8.7
5.0 7.7 8.7 7.5 7.5 7.5 5.9 5.5 5.5 5.3 4.8 4.0 3.9 7.8 8.8 5.2 5.8 7.0 6.4 6.2 5.2 4.7 3.4 3.2 3.9 3.1 2.8 2.9 3.7 4.4 4.8 4.7 4.6 3.6 3.2 4.1
4.8 7.3 8.7 9.0 11.3 10.7 9.6 6.8 4.3 7.4 9.0 8.0 4.6 8.7 8.0 7.5 7.0 7.2 4.5 3.6 3.4 3.3 3.1 6.4 9.0 4.1 6.3 5.8 10.2 12.6 11.5 10.8 6.1 5.1 3.5 2.8
7.0 5.8 7.8 9.6 9.7 9.4 8.5 3.9 4.5 6.6 10.3 10.1 7.8 11.0 11.5 11.9 10.4 8.3 7.3 11.4 11.4 6.0 4.6 8.9 11.7 10.6 11.7 13.3 13.8 14.6 11.8 13.5 13.7 12.1 11.5 9.0
10.4 5.7 3.9 2.9 1.6 1.7 2.3 1.4 1.4 3.3 13.0 13.3 12.6 12.0 6.7 5.1 3.2 3.3 7.8 15.8 14.1 9.4 5.5 7.1 8.6 11.8 13.3 13.8 13.4 14.0 12.0 12.8 13.5 10.7 10.8 10.4
12.6 13.0 11.2 7.9 5.5 3.9 4.4 3.8 2.3 3.4 11.1 13.7 13.5 10.9 7.6 4.8 2.6 1.9 2.7 14.8 12.8 10.2 10.8 7.3 7.9 9.0 4.7 5.0 7.8 11.2 13.4 12.9 10.9 9.9 11.7 11.6
9.3 10.4 11.1 8.5 10.2 8.4 6.1 4.6 3.1 2.3 3.3 8.2 9.4 8.7 8.1 7.6 5.4 3.5 2.2 8.7 10.6 9.3 8.2 5.6 4.8 3.7 3.2 2.4 2.4 6.2 7.1 7.1 5.3 5.5 7.0 7.6
6.5 8.1 8.6 8.1 7.8 9.1 6.0 6.0 5.1 3.1 3.3 9.3 7.4 6.1 6.9 6.7 6.8 5.4 4.1 5.2 8.1 6.5 4.7 5.1 6.1 5.7 4.8 3.7 4.1 5.0 5.7 6.1 6.2 6.7 6.8 6.3
5.8 5.8 6.0 6.0 5.6 5.7 6.0 5.3 5.4 4.7 5.8 7.1 7.2 6.2 5.9 5.7 6.3 6.3 5.9 5.4 4.9 5.9 6.5 6.4 7.1 6.7 7.0 5.9 4.8 4.4 3.9 4.7 5.1 5.4 5.7 5.9
4.2 4.2 4.4 4.5 4.4 4.2 4.1 4.4 4.4 4.5 5.4 6.4 6.1 6.2 5.8 5.8 6.1 4.9 4.6 4.9 4.9 4.9 5.0 5.3 5.3 5.6 5.7 6.0 5.9 5.1 4.4 4.2 4.8 5.1 5.1 4.7
4.1 4.2 4.5 4.2 3.9 3.8 3.7 3.6 3.8 3.8 4.0 5.4 6.1 5.0 4.3 4.5 4.1 4.0 3.8 3.9 4.0 4.1 5.0 5.4 4.9 4.0 4.4 4.8 5.2 4.6 4.0 3.7 3.8 3.8 3.9 4.1
3.3 3.6 4.2 4.6 4.6 4.5 4.5 4.3 4.9 5.1 4.8 5.2 5.6 4.9 4.5 4.0 3.6 3.7 3.6 3.9 4.0 3.8 3.9 3.1 2.7 2.6 2.4 2.5 2.3 2.5 2.6 2.3 2.1 2.9 4.5 3.3
3.8 3.4 4.0 4.4 4.6 4.7 4.7 4.4 4.3 4.0 4.2 4.3 4.5 4.5 4.3 3.4 2.4 2.2 2.1 2.1 2.2 1.9 1.7 1.8 1.6 1.5 1.6 1.7 1.8 2.0 2.2 2.4 2.5 3.2 3.8 3.7

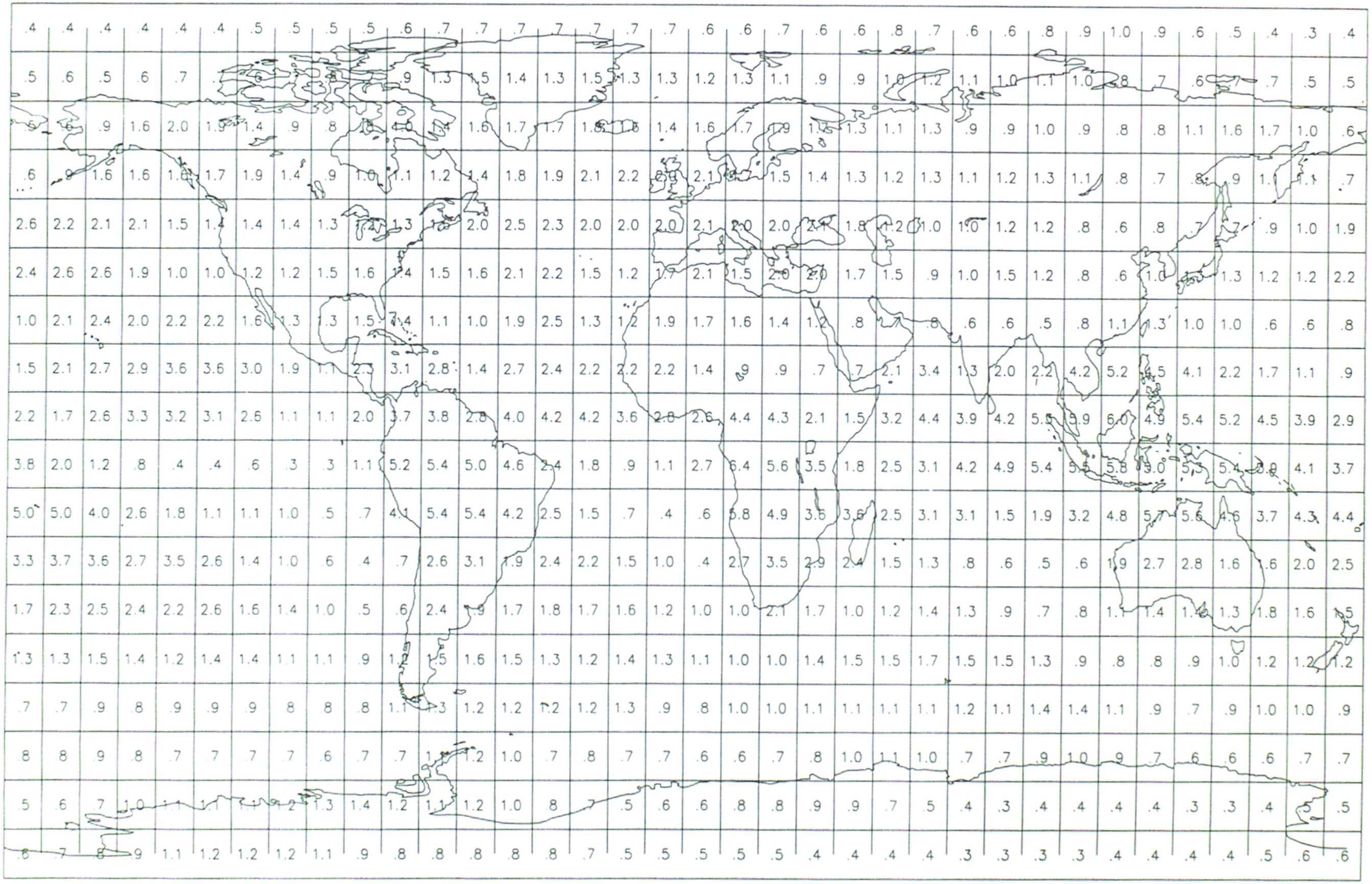
ATOVS : MEAN O–B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)
DECEMBER 1999 : HIRS4 channel (400 hPa)
NOAA–15, USING ALL OBSERVATIONS

FIGURE 32


-.8 -.8 -.7 -.7 -.7 -.7 -.7 -.8 -.8 -.8 -.7 -.9 -1.0 -1.1 -1.1 -1.3 -1.4 -1.4 -1.4 -1.4 -1.4 -1.4 -1.4 -1.5 -1.4 -1.4 -1.4 -1.5 -1.5 -1.5 -1.4 -1.3 -1.1 -1.0 -.9 -.9
-.3 -.2 -.2 -.3 -.3 [illegible] -.4 [illegible] -.5 -.6 -.8 -1.1 -1.3 -1.2 -1.2 -1.7 -1.7 -1.7 -1.8 -1.8 -1.7 -1.6 -1.7 -1.8 -1.8 -1.8 -1.9 -1.9 -1.7 -1.5 -1.4 -1.5 -1.1 -.9 -.7 -.5
-.3 -.3 .1 -.3 -.7 -.9 -.7 -.5 -.5 -.6 -.9 -1.3 -1.6 -1.6 -1.8 -2.1 -2.1 -1.9 -1.9 -1.9 -1.9 -1.9 -1.9 -1.8 -1.9 -1.6 -1.7 -1.6 -1.5 -1.4 -1.2 -1.3 -1.2 -1.0 -.3 .2
.4 .2 -.5 -.9 -1.3 -1.4 -1.5 -1.0 -.8 -.8 -.9 -1.0 -1.3 -1.7 -1.9 -2.2 -2.4 -2.1 -2.2 -1.9 -2.0 -1.9 -2.0 -1.9 -1.8 -1.7 -1.7 -1.6 -1.3 -.8 -.7 -.5 -.4 -.6 -.3 .1
-1.4 -1.4 -1.7 -2.1 -1.7 -1.7 -1.6 -1.4 -1.2 [illegible] -1.2 -2.5 -2.1 -2.5 -2.9 -2.8 -2.5 -2.5 -2.3 -2.1 -2.3 -2.4 -2.1 -1.7 -1.6 -1.5 -1.3 -1.1 -.6 -.3 -.1 -.1 -.2 -.3 -.4 -.8
-2.1 -2.5 -2.5 -2.1 -1.4 -1.4 -1.5 -1.5 -1.6 -1.8 -1.7 -1.7 -1.7 -2.2 -2.5 -1.8 -1.6 -1.9 -1.8 -1.5 -1.8 -2.0 -1.9 -1.8 -1.3 -1.1 -.7 -.5 -.6 -.5 -.7 -2.0 -1.2 -1.2 -1.3 -1.7
-1.4 -2.2 -2.3 -2.0 -2.3 -2.3 -1.9 -1.6 -1.7 -1.9 -1.8 -1.6 -1.3 -1.8 -2.2 -1.7 -1.7 -2.1 -1.9 -1.6 -1.5 -1.5 -1.4 -1.4 -1.5 -1.3 -1.0 -1.0 -1.1 -1.5 -1.7 -1.6 -1.6 -1.3 -1.3 -1.4
-1.5 -2.1 -2.5 -2.8 -3.9 -3.8 -3.3 -2.1 -1.6 -2.4 -3.0 -2.5 -1.7 -2.6 -2.9 -2.9 -2.8 -2.5 -1.9 -1.6 -1.5 -1.5 -1.5 -1.9 -2.6 -1.7 -1.9 -2.1 -3.6 -5.1 -4.3 -3.6 -2.2 -1.7 -1.6 -1.4
-2.0 -1.9 -2.2 -2.9 -2.8 -2.6 -2.3 -1.5 -1.5 -2.0 -3.9 -4.3 -3.0 -3.8 -4.1 -3.9 -3.3 -2.7 -2.8 -3.9 -3.6 -2.1 -1.6 -2.7 -3.7 -3.3 -4.2 -6.4 -7.3 -8.4 -5.9 -6.4 -5.9 -4.8 -3.5 -2.6
-2.9 -2.1 -1.7 -1.5 -1.4 -1.4 -1.4 -1.3 -1.3 -1.7 -5.6 -7.2 -6.2 -5.0 -2.7 -2.0 -1.5 -1.6 -2.6 -6.8 -6.4 -3.2 -2.0 -2.6 -3.1 -4.1 -5.4 -6.9 -9.0 -8.8 -7.2 -7.4 -6.5 -4.4 -3.6 -3.1
-4.6 -4.5 -3.8 -2.5 -1.9 -1.5 -1.5 -1.5 -1.3 -1.5 -3.9 -5.7 -5.8 -4.1 -2.6 -2.0 -1.5 -1.4 -1.4 -6.0 -5.0 -3.0 -3.0 -2.2 -2.5 -2.4 -1.7 -2.0 -2.8 -4.5 -6.7 -5.5 -4.2 -3.6 -4.6 -4.2
-3.0 -3.8 -4.3 -3.1 -3.5 -2.6 -1.6 -1.4 -1.1 -1.2 -1.5 -2.1 -2.6 -2.1 -2.5 -2.5 -1.8 -1.4 -1.2 -2.1 -3.5 -2.6 -2.2 -1.8 -1.6 -1.3 -1.2 -1.2 -1.3 -1.8 -2.4 -2.4 -1.7 -1.7 -2.1 -2.5
-1.6 -2.2 -2.7 -2.4 -2.2 -2.9 -1.7 -1.5 -1.1 -.9 -1.0 -1.9 -2.0 -1.7 -1.7 -1.6 -1.6 -1.4 -1.1 -1.1 -1.9 -1.7 -1.3 -1.4 -1.5 -1.5 -1.2 -1.0 -1.2 -1.3 -1.4 -1.4 -1.4 -1.6 -1.5 -1.4
-1.0 -1.2 -1.4 -1.3 -1.2 -1.4 -1.3 -1.0 -1.0 -.9 -1.1 -1.4 -1.4 -1.4 -1.3 -1.1 -1.2 -1.2 -1.1 -1.1 -1.0 -1.2 -1.2 -1.2 -1.3 -1.3 -1.3 -1.0 -.9 -.9 -.8 -.8 -.9 -1.1 -1.0 -.9
-.4 -.5 -.6 -.7 -.6 -.5 -.5 -.4 -.4 -.4 -.6 -.8 -.8 -.9 -.9 -.7 -.7 -.7 -.5 -.6 -.6 -.6 -.5 -.5 -.5 -.5 -.5 -.6 -.5 -.5 -.4 -.3 -.5 -.5 -.6 -.5
0 -.1 -.2 -.2 -.2 -.1 .0 .1 .0 -.1 -.2 -.4 -.4 -.3 -.2 -.2 -.1 -.3 -.3 -.2 -.2 -.3 -.3 -.2 -.2 .0 .0 .0 .0 .1 .2 .2 .1 .1 .0 .0
3 3 .3 .2 .2 .1 .0 .0 -.1 -.2 -.3 -.3 -.2 -.1 -.1 .0 .0 .0 .0 -.1 -.1 .0 .2 .3 .3 .4 .6 .7 .8 .8 .8 .8 .8 .6 .4 .3
.4 .4 .4 .3 .3 .2 .1 .1 .1 .2 .1 .1 .1 .0 .0 .1 .3 .3 .3 .3 .3 .4 .4 .4 .5 .5 .5 .6 .6 .6 .7 .6 .6 .5 .4 .4

ATOVS : SD O–B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
DECEMBER 1999 : HIRS4 channel (400 hPa)
NOAA–15, USING ALL OBSERVATIONS

FIGURE 33



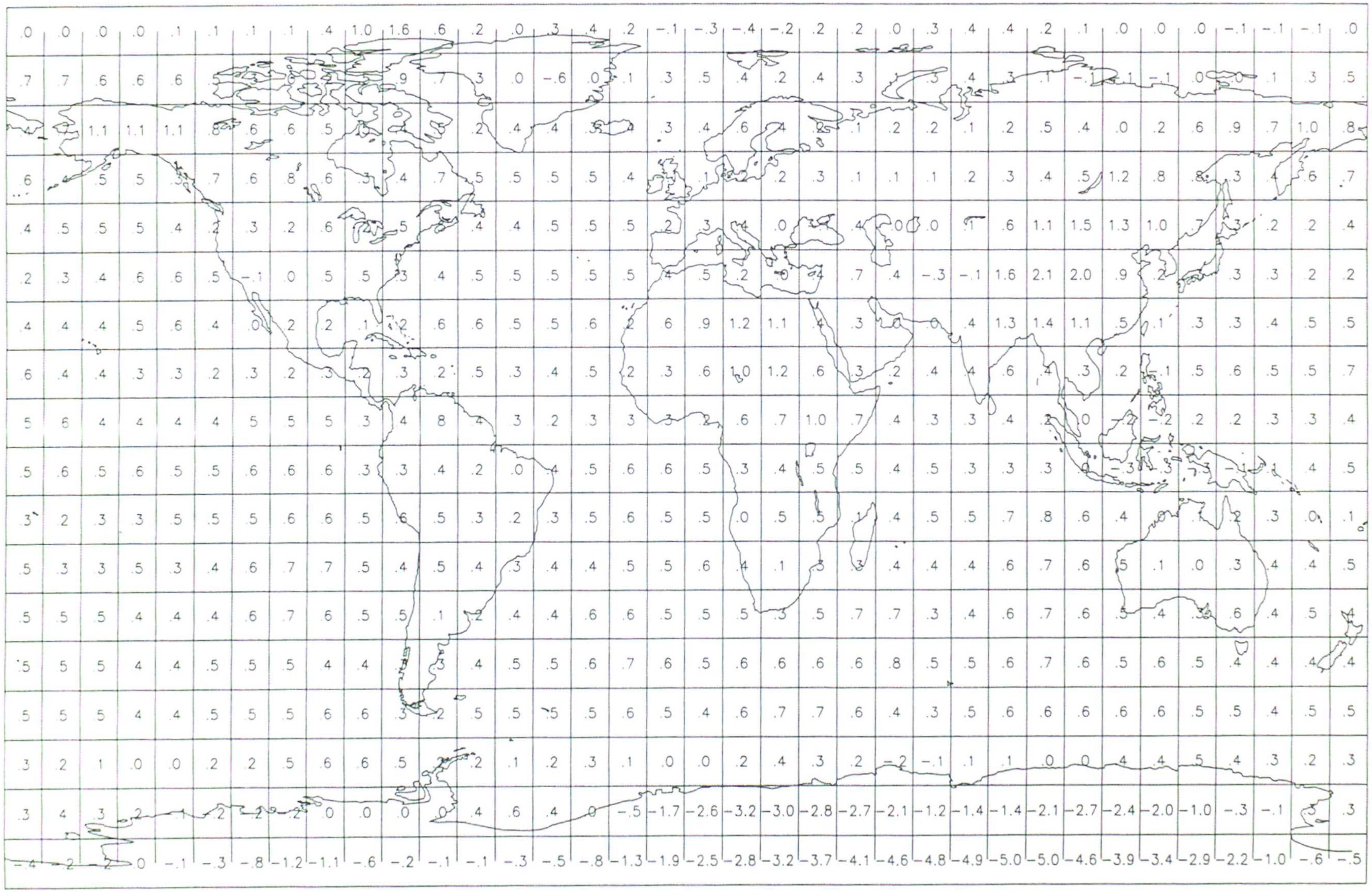
.4	.4	.4	.4	.4	.4	.5	.5	.5	.5	.6	.7	.7	.7	.7	.7	.7	.7	.6	.6	.7	.6	.6	.8	.7	.6	.6	.8	.9	1.0	.9	.6	.5	.4	.3	.4
.5	.6	.5	.6	.7	.7	.6	[illegible]	.8	[illegible]	.9	1.3	1.5	1.4	1.3	1.5	1.3	1.3	1.2	1.3	1.1	.9	.9	1.0	1.2	1.1	1.0	1.1	1.0	.8	.7	.6	.7	.7	.5	.5
.5	.6	.9	1.6	2.0	1.9	1.4	.9	.8	.8	[illegible]	1.4	1.6	1.7	1.7	1.8	1.8	1.4	1.6	1.7	1.9	1.7	1.3	1.1	1.3	.9	.9	1.0	.9	.8	.8	1.1	1.6	1.7	1.0	.6
.6	.9	1.6	1.6	1.6	1.7	1.9	1.4	.9	1.0	1.1	1.2	1.4	1.8	1.9	2.1	2.2	2.0	2.1	1.7	1.5	1.4	1.3	1.2	1.3	1.1	1.2	1.3	1.1	.8	.7	.8	.9	[illegible]	1.1	.7
2.6	2.2	2.1	2.1	1.5	1.4	1.4	1.4	1.3	1.2	1.3	1.5	2.0	2.5	2.3	2.0	2.0	2.0	2.1	2.0	2.0	2.1	1.8	1.2	1.0	1.0	1.2	1.2	.8	.6	.8	.7	.7	.9	1.0	1.9
2.4	2.6	2.6	1.9	1.0	1.0	1.2	1.2	1.5	1.6	1.4	1.5	1.6	2.1	2.2	1.5	1.2	1.7	2.1	1.5	2.0	2.0	1.7	1.5	.9	1.0	1.5	1.2	.8	.6	1.0	1.3	1.3	1.2	1.2	2.2
1.0	2.1	2.4	2.0	2.2	2.2	1.6	1.3	1.3	1.5	1.4	1.1	1.0	1.9	2.5	1.3	1.2	1.9	1.7	1.6	1.4	1.2	.8	.7	.8	.6	.6	.5	.8	1.1	1.3	1.0	1.0	.6	.6	.8
1.5	2.1	2.7	2.9	3.6	3.6	3.0	1.9	1.1	2.3	3.1	2.8	1.4	2.7	2.4	2.2	2.2	2.2	1.4	.9	.9	.7	.7	2.1	3.4	1.3	2.0	2.2	4.2	5.2	4.5	4.1	2.2	1.7	1.1	.9
2.2	1.7	2.6	3.3	3.2	3.1	2.6	1.1	1.1	2.0	3.7	3.8	2.8	4.0	4.2	4.2	3.6	2.8	2.6	4.4	4.3	2.1	1.5	3.2	4.4	3.9	4.2	5.5	5.9	6.0	4.9	5.4	5.2	4.5	3.9	2.9
3.8	2.0	1.2	.8	.4	.4	.6	.3	.3	1.1	5.2	5.4	5.0	4.6	2.4	1.8	.9	1.1	2.7	6.4	5.6	3.5	1.8	2.5	3.1	4.2	4.9	5.4	5.5	5.8	3.0	5.3	5.4	3.8	4.1	3.7
5.0	5.0	4.0	2.6	1.8	1.1	1.1	1.0	.5	.7	4.1	5.4	5.4	4.2	2.5	1.5	.7	.4	.6	5.8	4.9	3.5	3.6	2.5	3.1	3.1	1.5	1.9	3.2	4.8	5.7	5.6	4.6	3.7	4.3	4.4
3.3	3.7	3.6	2.7	3.5	2.6	1.4	1.0	.6	.4	.7	2.6	3.1	1.9	2.4	2.2	1.5	1.0	.4	2.7	3.5	2.9	2.4	1.5	1.3	.8	.6	.5	.6	1.9	2.7	2.8	1.6	.6	2.0	2.5
1.7	2.3	2.5	2.4	2.2	2.6	1.6	1.4	1.0	.5	.6	2.4	1.9	1.7	1.8	1.7	1.6	1.2	1.0	1.0	2.1	1.7	1.0	1.2	1.4	1.3	.9	.7	.8	1.1	1.4	1.4	1.3	1.8	1.6	1.5
1.3	1.3	1.5	1.4	1.2	1.4	1.4	1.1	1.1	.9	1.2	1.5	1.6	1.5	1.3	1.2	1.4	1.3	1.1	1.0	1.0	1.4	1.5	1.5	1.7	1.5	1.5	1.3	.9	.8	.8	.9	1.0	1.2	1.2	1.2
.7	.7	.9	.8	.9	.9	.9	.8	.8	.8	1.1	1.3	1.2	1.2	1.2	1.2	1.3	.9	.8	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.1	1.4	1.4	1.1	.9	.7	.9	1.0	1.0	.9
.8	.8	.9	.8	.7	.7	.7	.7	.6	.7	.7	[illegible]	1.2	1.0	.7	.8	.7	.7	.6	.6	.7	.8	1.0	1.1	1.0	.7	.7	.9	1.0	.9	.7	.6	.6	.6	.7	.7
.5	.6	.7	1.0	1.1	1.1	1.1	1.2	1.3	1.4	1.2	1.1	1.2	1.0	.8	.7	.5	.6	.6	.8	.8	.9	.9	.7	.5	.4	.3	.4	.4	.4	.4	.3	.3	.4	.5	.5
.6	.7	.8	.9	1.1	1.2	1.2	1.2	1.1	.9	.8	.8	.8	.8	.8	.7	.5	.5	.5	.5	.5	.4	.4	.4	.4	.3	.3	.3	.3	.4	.4	.4	.4	.5	.6	.6

ATOVS : MEAN O-B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)

FIGURE 34

DECEMBER 1999 : AMSUA-5 Channel (700 hPa)

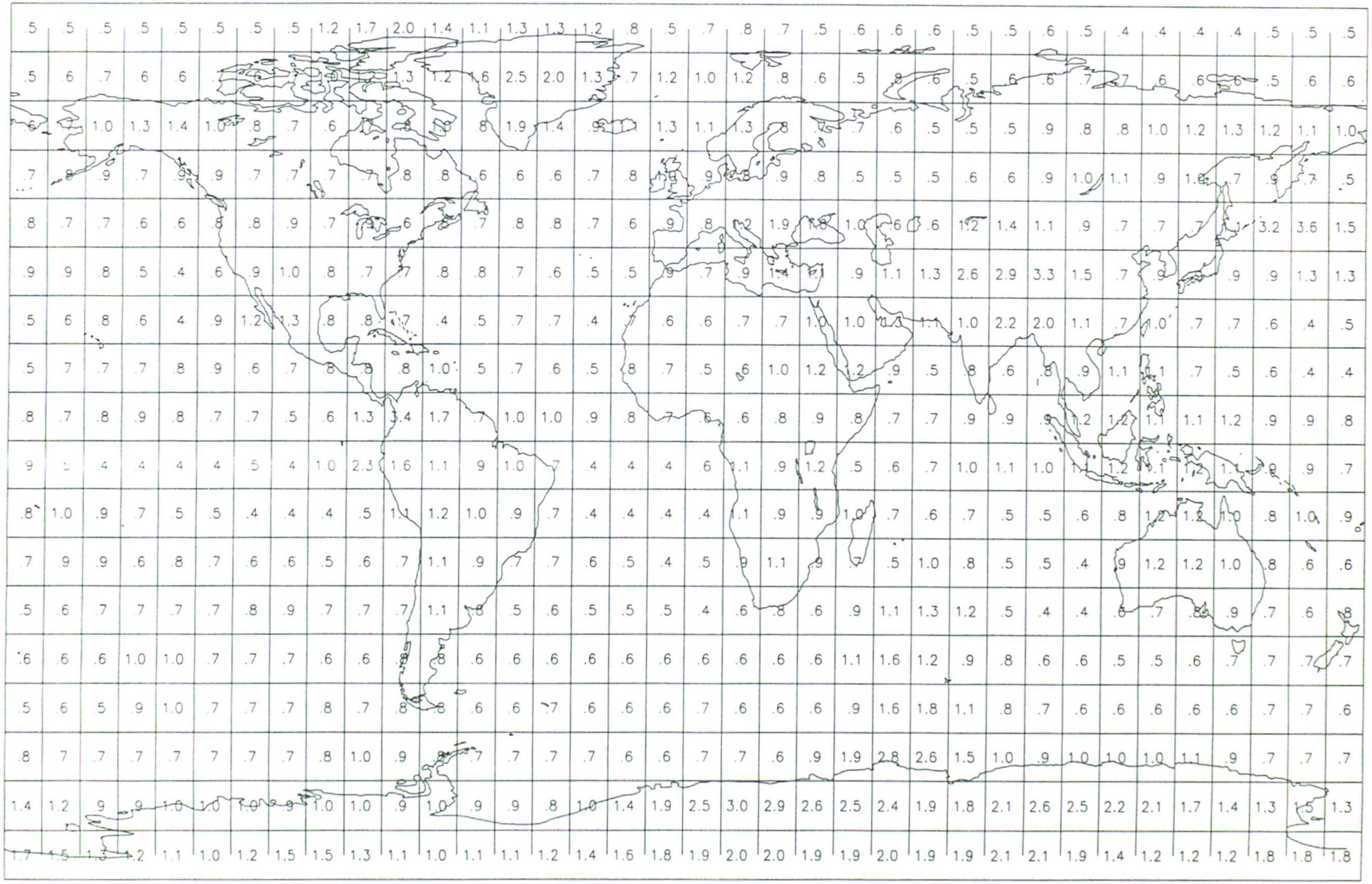
NOAA-15, USING ALL OBSERVATIONS



.0	.0	.0	.0	.1	.1	.1	.1	.4	1.0	1.6	.6	.2	.0	.3	.4	.2	-.1	-.3	-.4	-.2	.2	.2	.0	.3	.4	.4	.2	.1	.0	.0	.0	-.1	-.1	-.1	.0
.7	.7	.6	.6	.6	.5	.3	.6	[illegible]	[illegible]	.9	.7	.3	.0	-.6	.0	.1	.3	.5	.4	.2	.4	.3	.1	.3	.4	.3	.1	-.1	.1	-.1	.0	.0	.1	.3	.5
.4	.7	1.1	1.1	1.1	.8	.6	.6	.5	[illegible]	[illegible]	.5	.2	.4	.4	.3	.4	.3	.4	.6	.4	.2	.1	.2	.2	.1	.2	.5	.4	.0	.2	.6	.9	.7	1.0	.8
.6	.4	.5	.5	.3	.7	.6	.8	.6	.3	.4	.7	.5	.5	.5	.5	.4	[illegible]	.1	[illegible]	.2	.3	.1	.1	.1	.2	.3	.4	.5	1.2	.8	.8	.3	.4	.6	.7
.4	.5	.5	.5	.4	.2	.3	.2	.6	[illegible]	.5	[illegible]	.4	.4	.5	.5	.5	.2	.3	.4	.0	[illegible]	.4	.0	.0	.1	.6	1.1	1.5	1.3	1.0	.7	.3	.2	.2	.4
.2	.3	.4	.6	.6	.5	-.1	.0	.5	.5	.3	.4	.5	.5	.5	.5	.5	.4	.5	.2	.0	.4	.7	.4	-.3	-.1	1.6	2.1	2.0	.9	.2	[illegible]	.3	.3	.2	.2
.4	.4	.4	.5	.6	.4	.0	.2	.2	.1	.2	.6	.6	.5	.5	.6	.2	.6	.9	1.2	1.1	.4	.3	.0	.0	.4	1.3	1.4	1.1	.5	.1	.3	.3	.4	.5	.5
.6	.4	.4	.3	.3	.2	.3	.2	.3	.2	.3	.2	.5	.3	.4	.5	.2	.3	.6	1.0	1.2	.6	.3	.2	.4	.4	.6	.4	.3	.2	-.1	.5	.6	.5	.5	.7
.5	.6	.4	.4	.4	.4	.5	.5	.5	.3	.4	.8	.4	.3	.2	.3	.3	.3	.2	.6	.7	1.0	.7	.4	.3	.3	.4	.2	.0	-.2	-.2	.2	.2	.3	.3	.4
.5	.6	.5	.6	.5	.5	.6	.6	.6	.3	.3	.4	.2	.0	.4	.5	.6	.6	.5	.3	.4	.5	.5	.4	.5	.3	.3	.3	.0	-.3	.3	.3	-.1	.1	.4	.5
.3	.2	.3	.3	.5	.5	.5	.6	.6	.5	.6	.5	.3	.2	.3	.5	.6	.5	.5	.0	.5	.5	.1	.4	.5	.5	.7	.8	.6	.4	.0	.1	.2	.3	.0	.1
.5	.3	.3	.5	.3	.4	.6	.7	.7	.5	.4	.5	.4	.3	.4	.4	.5	.5	.6	.4	.1	.3	.3	.4	.4	.4	.6	.7	.6	.5	.1	.0	.3	.4	.4	.5
.5	.5	.5	.4	.4	.4	.6	.7	.6	.5	.5	.1	.2	.4	.4	.6	.6	.5	.5	.5	.3	.5	.7	.7	.3	.4	.6	.7	.6	.5	.4	.3	.6	.4	.5	.4
.5	.5	.5	.4	.4	.5	.5	.5	.4	.4	[illegible]	.3	.4	.5	.5	.6	.7	.6	.5	.6	.6	.6	.6	.8	.5	.5	.6	.7	.6	.5	.6	.5	.4	.4	.4	.4
.5	.5	.5	.4	.4	.5	.5	.5	.6	.6	.3	.2	.5	.5	.5	.5	.6	.5	.4	.6	.7	.7	.6	.4	.3	.5	.6	.6	.6	.6	.6	.5	.5	.4	.5	.5
.3	.2	.1	.0	.0	.2	.2	.5	.6	.6	.5	[illegible]	.2	.1	.2	.3	.1	.0	.0	.2	.4	.3	.2	-.2	-.1	.1	.1	.0	.0	.4	.4	.5	.4	.3	.2	.3
.3	.4	.3	.2	.1	.2	.2	.2	.0	.0	.0	.0	.4	.6	.4	.0	-.5	-1.7	-2.6	-3.2	-3.0	-2.8	-2.7	-2.1	-1.2	-1.4	-1.4	-2.1	-2.7	-2.4	-2.0	-1.0	-.3	-.1	.3	.3
-.4	-.2	-.2	.0	-.1	-.3	-.8	-1.2	-1.1	-.6	-.2	-.1	-.1	-.3	-.5	-.8	-1.3	-1.9	-2.5	-2.8	-3.2	-3.7	-4.1	-4.6	-4.8	-4.9	-5.0	-5.0	-4.6	-3.9	-3.4	-2.9	-2.2	-1.0	-.6	-.5

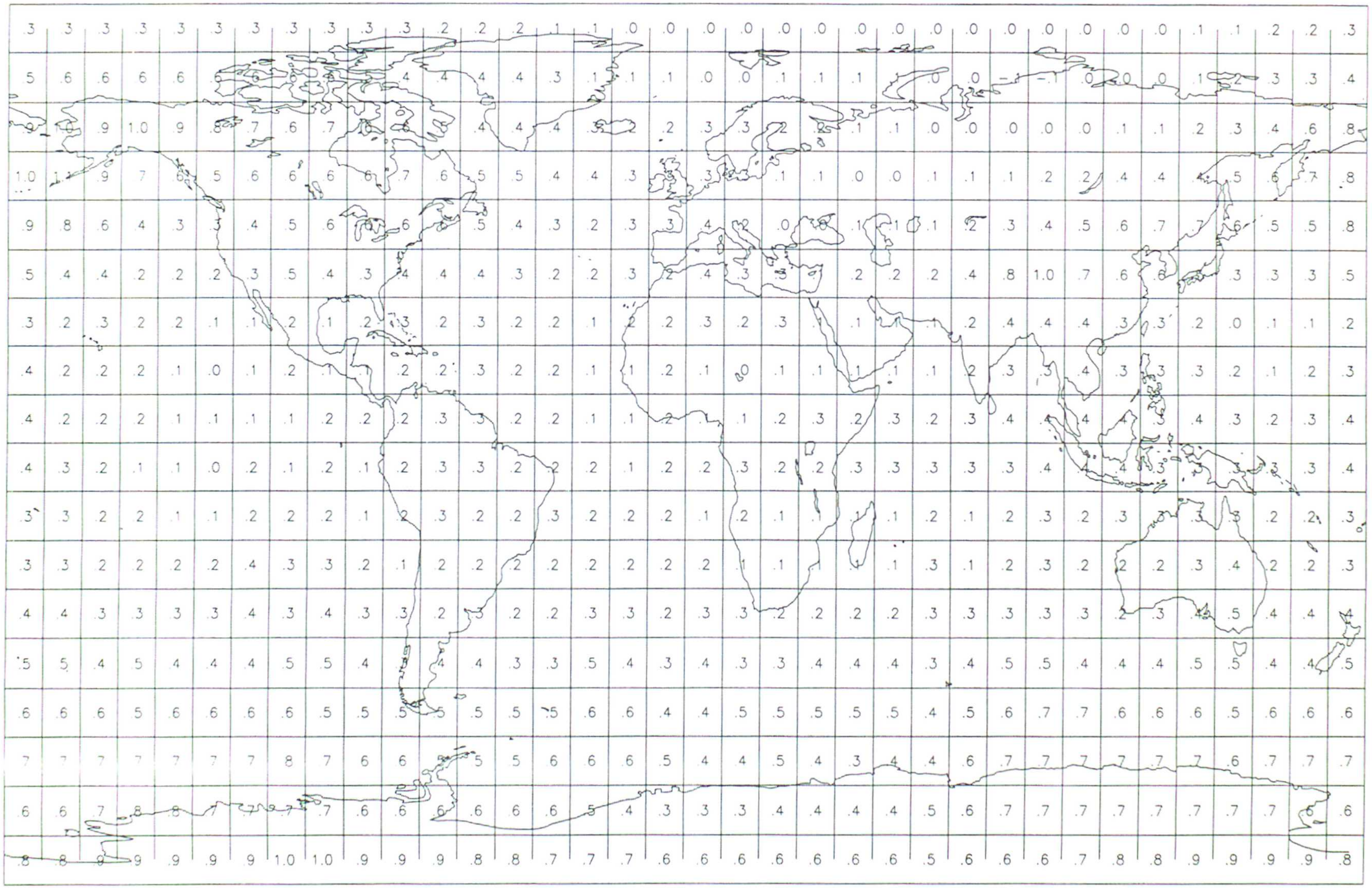
ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
DECEMBER 1999 : AMSUA-5 channel (700 hPa)
NOAA-15, USING ALL OBSERVATIONS

FIGURE 35


.5 .5 .5 .5 .5 .5 .5 .5 1.2 1.7 2.0 1.4 1.1 1.3 1.3 1.2 .8 .5 .7 .8 .7 .5 .6 .6 .6 .5 .5 .6 .5 .4 .4 .4 .4 .5 .5 .5
.5 .6 .7 .6 .6 .7 .6 [illegible] [illegible] [illegible] 1.3 1.2 1.6 2.5 2.0 1.3 .7 1.2 1.0 1.2 .8 .6 .5 .8 .6 .5 .6 .6 .7 .7 .6 .6 .6 .5 .6 .6
.6 .7 1.0 1.3 1.4 1.0 .8 .7 .6 .7 .8 1.0 .8 1.9 1.4 .9 1.1 1.3 1.1 1.3 .8 .7 .7 .6 .5 .5 .5 .9 .8 .8 1.0 1.2 1.3 1.2 1.1 1.0
.7 .8 .9 .7 .9 .9 .7 .7 .7 .7 .8 .8 .6 .6 .6 .7 .8 1.0 .9 .8 .9 .8 .5 .5 .5 .6 .6 .9 1.0 1.1 .9 1.0 .7 .9 .7 .5
.8 .7 .7 .6 .6 .8 .8 .9 .7 .9 .6 .8 .7 .8 .8 .7 .6 .9 .8 1.2 1.9 1.8 1.0 .6 .6 1.2 1.4 1.1 .9 .7 .7 .7 1.1 3.2 3.6 1.5
.9 .9 .8 .5 .4 .6 .9 1.0 .8 .7 .7 .8 .8 .7 .6 .5 .5 .9 .7 .9 1.4 1.1 .9 1.1 1.3 2.6 2.9 3.3 1.5 .7 .9 [illegible] .9 .9 1.3 1.3
.5 .6 .8 .6 .4 .9 1.2 1.3 .8 .8 .7 .4 .5 .7 .7 .4 .7 .6 .6 .7 .7 1.0 1.0 1.3 1.1 1.0 2.2 2.0 1.1 .7 1.0 .7 .7 .6 .4 .5
.5 .7 .7 .7 .8 .9 .6 .7 .8 .8 .8 1.0 .5 .7 .6 .5 .8 .7 .5 .6 1.0 1.2 1.2 .9 .5 .8 .6 .8 .9 1.1 1.1 .7 .5 .6 .4 .4
.8 .7 .8 .9 .8 .7 .7 .5 .6 1.3 3.4 1.7 .7 1.0 1.0 .9 .8 .7 .6 .6 .8 .9 .8 .7 .7 .9 .9 .9 1.2 1.2 1.1 1.1 1.2 .9 .9 .8
.9 [illegible] .4 .4 .4 .4 .5 .4 1.0 2.3 1.6 1.1 .9 1.0 .7 .4 .4 .4 .6 1.1 .9 1.2 .5 .6 .7 1.0 1.1 1.0 1.1 1.2 1.1 1.2 1.1 .9 .9 .7
.8 1.0 .9 .7 .5 .5 .4 .4 .4 .5 1.1 1.2 1.0 .9 .7 .4 .4 .4 .4 1.1 .9 .9 1.0 .7 .6 .7 .5 .5 .6 .8 1.2 1.2 1.0 .8 1.0 .9
.7 .9 .9 .6 .8 .7 .6 .6 .5 .6 .7 1.1 .9 .7 .7 .6 .5 .4 .5 .9 1.1 .9 .7 .5 1.0 .8 .5 .5 .4 .9 1.2 1.2 1.0 .8 .6 .6
.5 .6 .7 .7 .7 .7 .8 .9 .7 .7 .7 1.1 .8 .5 .6 .5 .5 .5 .4 .6 .8 .6 .9 1.1 1.3 1.2 .5 .4 .4 .6 .7 .8 .9 .7 .6 .8
.6 .6 .6 1.0 1.0 .7 .7 .7 .6 .6 .8 .8 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 1.1 1.6 1.2 .9 .8 .6 .6 .5 .5 .6 .7 .7 .7 .7
.5 .6 .5 .9 1.0 .7 .7 .7 .8 .7 .8 .8 .6 .6 .7 .6 .6 .6 .7 .6 .6 .6 .9 1.6 1.8 1.1 .8 .7 .6 .6 .6 .6 .6 .7 .7 .6
.8 .7 .7 .7 .7 .7 .7 .7 .8 1.0 .9 .8 .7 .7 .7 .7 .6 .6 .7 .7 .6 .9 1.9 2.8 2.6 1.5 1.0 .9 1.0 1.0 1.0 1.1 .9 .7 .7 .7
1.4 1.2 .9 .9 1.0 1.0 1.0 .9 1.0 1.0 .9 1.0 .9 .9 .8 1.0 1.4 1.9 2.5 3.0 2.9 2.6 2.5 2.4 1.9 1.8 2.1 2.6 2.5 2.2 2.1 1.7 1.4 1.3 1.5 1.3
1.7 1.5 1.3 1.2 1.1 1.0 1.2 1.5 1.5 1.3 1.1 1.0 1.1 1.1 1.2 1.4 1.6 1.8 1.9 2.0 2.0 1.9 1.9 2.0 1.9 1.9 2.1 2.1 1.9 1.4 1.2 1.2 1.2 1.8 1.8 1.8

ATOVS : MEAN O-B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)
DECEMBER 1999 : AMSUA-7 Channel (300 hPa)
NOAA-15, USING ALL OBSERVATIONS

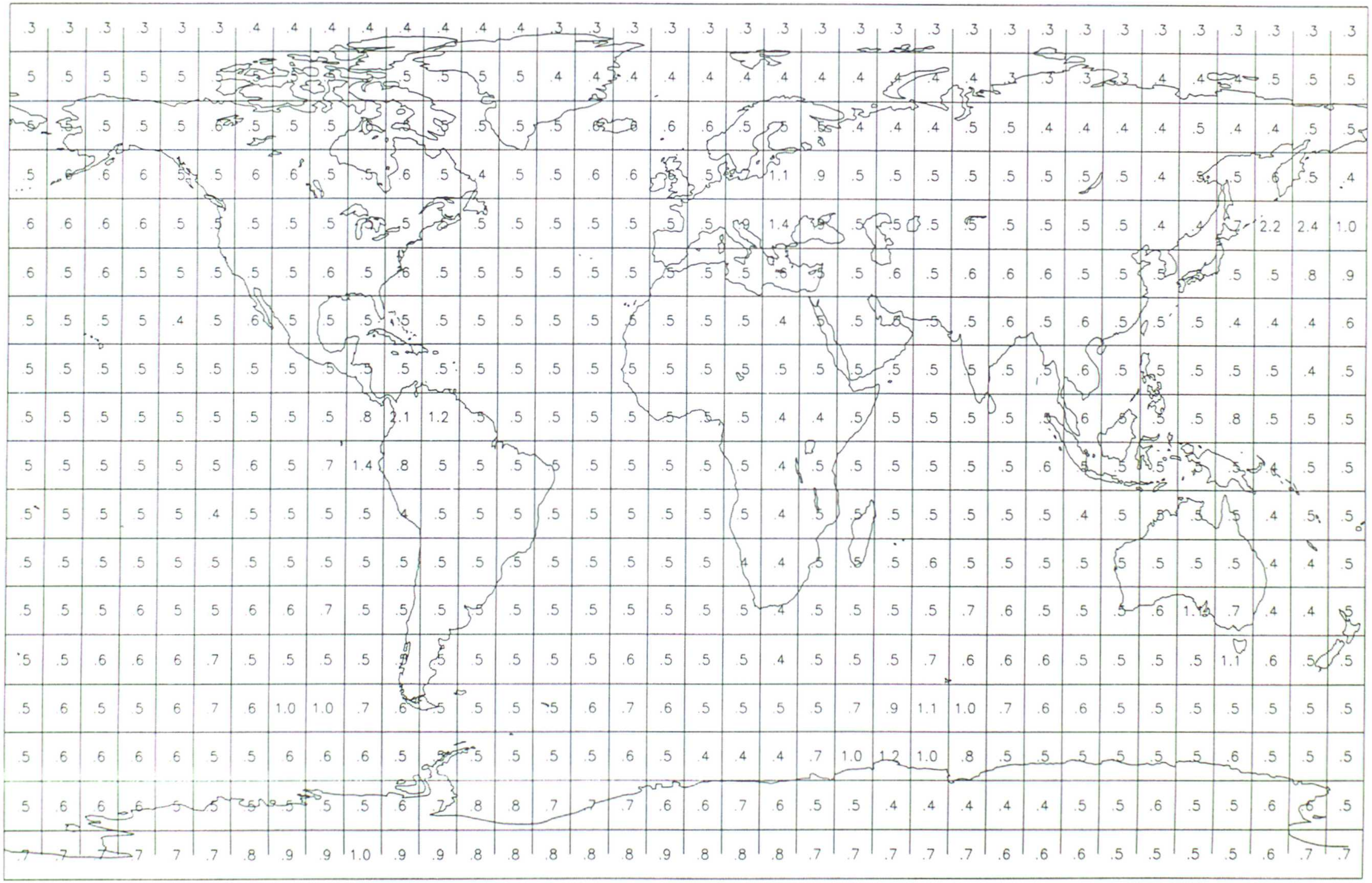
FIGURE 36



.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.2	.2	.2	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.2	.2	.3
.5	.6	.6	6	.6	6	6	6	6	[illegible]	.4	.4	4	.4	.3	.1	.1	.1	.0	.0	.1	.1	.1	1	.0	.0	-.1	-.1	.0	.0	.0	.1	.2	.3	.3	.4
.9	1.0	.9	1.0	.9	.8	.7	.6	.7	6	6	5	.4	.4	.4	.3	2	.2	.3	.3	2	.2	.1	.1	.0	.0	.0	.0	.0	.1	.1	.2	.3	.4	.6	.8
1.0	1.1	.9	7	6	.5	.6	6	.6	6	.7	.6	.5	.5	.4	.4	.3	3	.3	[illegible]	.1	.1	.0	.0	.1	.1	.1	.2	.2	.4	.4	4	.5	6	.7	.8
.9	.8	.6	.4	.3	3	.4	.5	.6	6	.6	6	.5	.4	.3	.2	.3	.3	.4	2	.0	0	.1	1	.1	.2	.3	.4	.5	.6	.7	7	6	.5	.5	.8
.5	.4	.4	.2	.2	.2	.3	.5	.4	.3	4	.4	.4	.3	.2	.2	.3	2	.4	.3	3	[illegible]	.2	.2	.2	.4	.8	1.0	.7	.6	6	[illegible]	.3	.3	.3	.5
.3	.2	.3	.2	.2	.1	.1	.2	.1	.2	3	.2	.3	.2	.2	.1	2	.2	.3	.2	.3	1	.1	1	.1	.2	.4	.4	.4	.3	.3	.2	.0	.1	.1	.2
.4	.2	.2	.2	.1	.0	.1	.2	1	1	.2	.2	.3	.2	.2	.1	1	.2	.1	0	.1	.1	.1	.1	.1	2	.3	3	.4	.3	3	.3	.2	.1	.2	.3
.4	.2	.2	.2	.1	.1	.1	.1	.2	.2	.2	.3	3	.2	.2	.1	.1	.2	.1	.1	.2	.3	.2	.3	.2	.3	.4	4	4	4	3	.4	.3	.2	.3	.4
.4	.3	.2	.1	.1	.0	.2	.1	.2	.1	.2	.3	.3	.2	2	.2	.1	.2	.2	.3	.2	.2	.3	.3	.3	.3	.3	.4	4	.4	.3	3	.3	3	.3	.4
.3	.3	.2	2	.1	.1	.2	.2	.2	.1	2	.3	.2	.2	.3	.2	.2	.2	.1	.2	.1	.1	.1	.1	.2	.1	.2	.3	.2	.3	3	.3	3	.2	.2	.3
.3	.3	.2	.2	.2	.2	.4	.3	.3	.2	.1	.2	.2	2	.2	.2	.2	.2	.2	1	.1	.1	.1	.1	.3	.1	.2	.3	.2	2	.2	.3	.4	2	.2	.3
.4	.4	.3	.3	.3	.3	.4	.3	.4	.3	.3	.2	3	.2	.2	.3	.3	.2	.3	.3	.2	.2	.2	.2	.3	.3	.3	.3	.3	2	.3	.4	.5	.4	.4	4
.5	5	.4	.5	.4	.4	.4	.5	.5	.4	3	.4	4	.3	.3	.5	.4	.3	.4	.3	.3	.4	.4	.4	.3	.4	.5	.5	.4	.4	.4	.5	.5	.4	.4	.5
.6	.6	.6	.5	.6	.6	.6	.6	.5	.5	.5	5	.5	.5	.5	.6	.6	.4	.4	.5	.5	.5	.5	.5	.4	.5	.6	.7	.7	.6	.6	.6	.5	.6	.6	.6
7	7	7	7	7	7	7	8	7	6	6	5	5	.5	6	.6	.6	.5	.4	.4	.5	.4	.3	.4	.4	.6	.7	.7	7	7	.7	7	.6	.7	.7	.7
.6	.6	.7	.8	.8	7	.7	.7	.7	.6	.6	6	.6	6	.6	5	.4	.3	.3	.3	.4	.4	.4	.4	.5	.6	.7	.7	.7	.7	.7	.7	.7	.7	6	.6
.8	.8	9	.9	.9	.9	.9	1.0	1.0	.9	.9	.9	.8	.8	.7	.7	.7	.6	.6	.6	.6	.6	.6	.6	.5	.6	.6	.6	.7	.8	.8	.9	.9	.9	.9	.8

ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)
DECEMBER 1999 : AMSUA-7 channel (300 hPa)
NOAA-15, USING ALL OBSERVATIONS

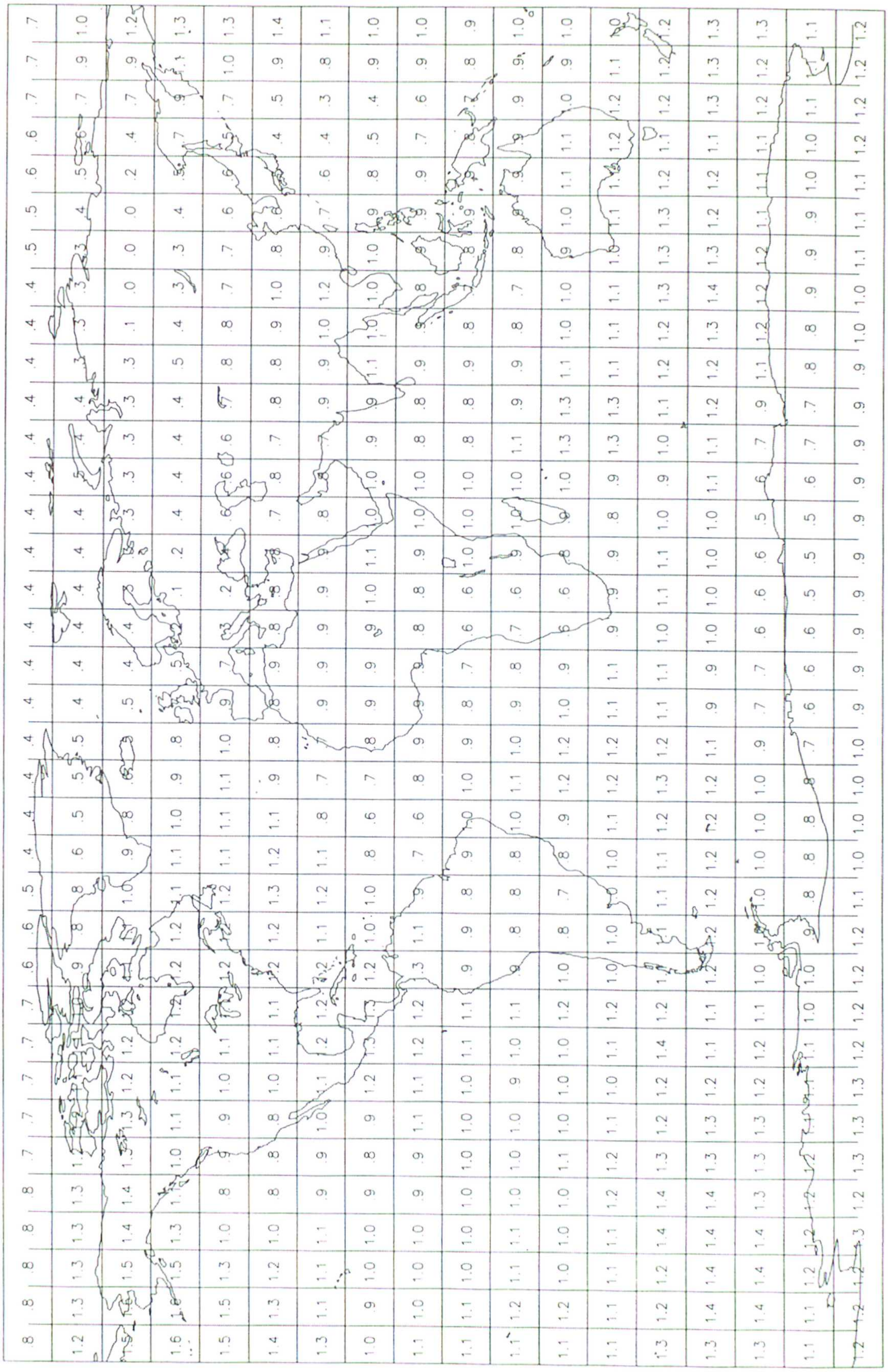
FIGURE 37



.3	.3	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.5	.5	.5	.5	.5	.5	.5	.5	.5	[illegible]	.5	.5	.5	.5	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.3	.3	.3	.3	.4	.4	.4	.5	.5	.5
.5	.5	.5	.5	.5	.6	.5	.5	.5	.5	.5	.5	.5	.5	.5	.6	.6	.6	.6	.5	.5	.5	.4	.4	.4	.5	.5	.4	.4	.4	.4	.5	.4	.4	.5	.5
.5	.6	.6	.6	.5	.5	.6	.6	.5	.5	.6	.5	.4	.5	.5	.6	.6	.6	.5	[illegible]	1.1	.9	.5	.5	.5	.5	.5	.5	.5	.5	.4	.5	.5	.6	.5	.4
.6	.6	.6	.6	.5	.5	.5	.5	.5	.5	.5		.5	.5	.5	.5	.5	.5	.5	.9	1.4	.9	.5	.5	.5	.5	.5	.5	.5	.5	.4	.4	.7	2.2	2.4	1.0
.6	.5	.6	.5	.5	.5	.5	.5	.6	.5	.6	.5	.5	.5	.5	.5	.5	.5	.5	.5	.6	.5	.5	.6	.5	.6	.6	.6	.5	.5	.5		.5	.5	.8	.9
.5	.5	.5	.5	.4	.5	.6	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.5	.5	.6	.5	.5	.6	.5	.6	.5	.5	.5	.4	.4	.4	.6
.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.6	.5	.5	.5	.5	.5	.4	.5
.5	.5	.5	.5	.5	.5	.5	.5	.5	.8	2.1	1.2	.5	.5	.5	.5	.5	.5	.5	.5	.4	.4	.5	.5	.5	.5	.5	.5	.6	.5	.5	.5	.8	.5	.5	.5
.5	.5	.5	.5	.5	.5	.6	.5	.7	1.4	.8	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.5	.5	.5	.5	.5	.5	.6	.5	.5	.5	.5	.5	.4	.5	.5
.5	.5	.5	.5	.5	.4	.5	.5	.5	.5	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.5	.5	.5	.5	.5	.5	.5	.4	.5	.5	.5	.5	.4	.5	.5
.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.4	.5	.5	.5	.6	.5	.5	.5	.5	.5	.5	.5	.5	.4	.4	.5
.5	.5	.5	.6	.5	.5	.6	.6	.7	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.4	.5	.5	.5	.5	.7	.6	.5	.5	.5	.6	1.1	.7	.4	.4	.5
.5	.5	.6	.6	.6	.7	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.6	.5	.5	.5	.4	.5	.5	.5	.7	.6	.6	.6	.5	.5	.5	.5	1.1	.6	.5	.5
.5	.6	.5	.5	.6	.7	.6	1.0	1.0	.7	.6	.5	.5	.5	.5	.6	.7	.6	.5	.5	.5	.5	.7	.9	1.1	1.0	.7	.6	.6	.5	.5	.5	.5	.5	.5	.5
.5	.6	.6	.6	.6	.5	.5	.6	.6	.6	.5	.5	.5	.5	.5	.5	.6	.5	.4	.4	.4	.7	1.0	1.2	1.0	.8	.5	.5	.5	.5	.5	.5	.6	.5	.5	.5
.5	.6	.6	.6	.5	.5	.5	.5	.5	.5	.6	.7	.8	.8	.7	.7	.7	.6	.6	.7	.6	.5	.5	.4	.4	.4	.4	.4	.5	.5	.6	.5	.5	.6	.6	.5
.7	.7	.7	.7	.7	.7	.8	.9	.9	1.0	.9	.9	.8	.8	.8	.8	.8	.9	.8	.8	.8	.7	.7	.7	.7	.7	.6	.6	.6	.5	.5	.5	.5	.6	.7	.7

ATOVS : MEAN O-B BRIGHTNESS TEMPERATURE DIFFERENCES (DEG C)
DECEMBER 1999 : AMSUA-9 Channel (100 hPa)
NOAA-15, USING ALL OBSERVATIONS

FIGURE 38



ATOVS : SD O-B BRIGHTNESS TEMPERATURE DIFFERENCES(DEG C)   FIGURE 39
DECEMBER 1999 : AMSUA-9 channel (100 hPa)
NOAA-15, USING ALL OBSERVATIONS

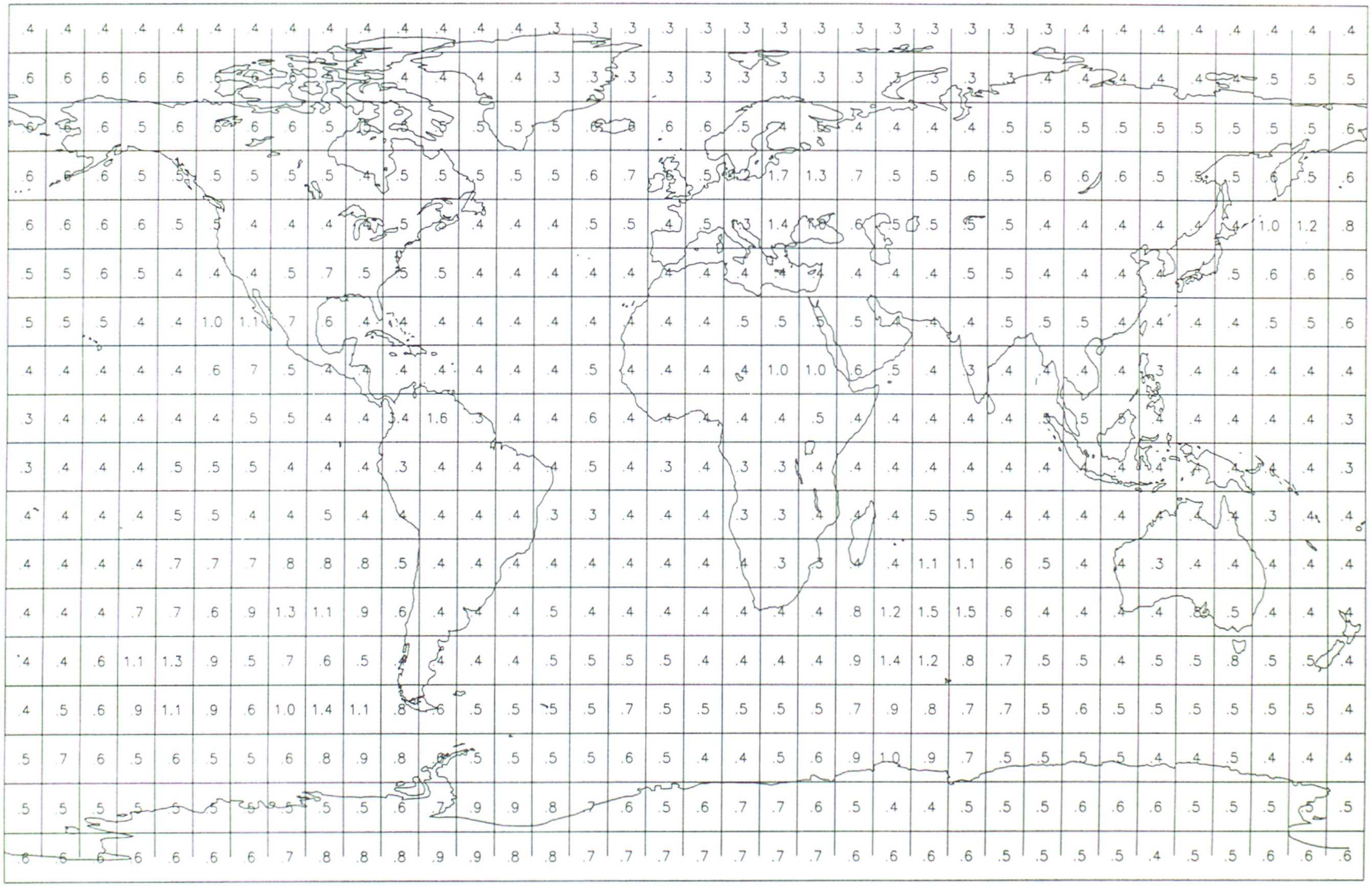

.4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .4 .4 .4 .4 .4 .4 .4 .4
.6 .6 .6 .6 .6 .6 .6 .6 .5 .4 .4 .4 .4 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .4 .4 .4 .4 .4 .4 .5 .5 .5
.6 .6 .6 .5 .6 .6 .6 .6 .5 .5 .5 .5 .5 .5 .5 .6 .6 .6 .6 .5 .4 .5 .4 .4 .4 .4 .5 .5 .5 .5 .5 .5 .5 .5 .5 .6
.6 .6 .6 .5 .5 .5 .5 .5 .5 .4 .5 .5 .5 .5 .5 .6 .7 .6 .5 1.7 1.3 .7 .5 .5 .6 .5 .6 .6 .6 .5 .5 .5 .6 .5 .6
.6 .6 .6 .6 .5 .5 .4 .4 .4 .4 .5 .4 .4 .4 .5 .5 .4 .5 1.3 1.4 1.0 .6 .5 .5 .5 .5 .4 .4 .4 .4 .4 .4 1.0 1.2 .8
.5 .5 .6 .5 .4 .4 .4 .5 .7 .5 .5 .5 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .5 .5 .4 .4 .4 .4 .5 .6 .6 .6
.5 .5 .5 .4 .4 1.0 1.1 .7 .6 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .5 .5 .5 .5 .4 .4 .4 .5 .5 .5 .4 .4 .4 .4 .5 .5 .6
.4 .4 .4 .4 .4 .6 .7 .5 .4 .4 .4 .4 .4 .4 .4 .5 .4 .4 .4 .4 1.0 1.0 .6 .5 .4 .3 .4 .4 .4 .4 .3 .4 .4 .4 .4 .4
.3 .4 .4 .4 .4 .4 .5 .5 .4 .4 3.4 1.6 .3 .4 .4 .6 .4 .4 .4 .4 .4 .5 .4 .4 .4 .4 .4 .5 .5 .5 .4 .4 .4 .4 .4 .3
.3 .4 .4 .4 .5 .5 .5 .4 .4 .4 .3 .4 .4 .4 .4 .5 .4 .3 .4 .3 .3 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .4 .3
.4 .4 .4 .4 .5 .5 .4 .4 .5 .4 .4 .4 .4 .4 .3 .3 .4 .4 .4 .3 .3 .4 .4 .4 .5 .5 .4 .4 .4 .4 .4 .4 .4 .3 .4 .4
.4 .4 .4 .4 .7 .7 .7 .8 .8 .8 .5 .4 .4 .4 .4 .4 .4 .4 .4 .4 .3 .3 .4 .4 1.1 1.1 .6 .5 .4 .4 .3 .4 .4 .4 .4 .4
.4 .4 .4 .7 .7 .6 .9 1.3 1.1 .9 .6 .4 .4 .4 .5 .4 .4 .4 .4 .4 .4 .4 .8 1.2 1.5 1.5 .6 .4 .4 .4 .4 .8 .5 .4 .4 .4
.4 .4 .6 1.1 1.3 .9 .5 .7 .6 .5 .4 .4 .4 .4 .5 .5 .5 .5 .4 .4 .4 .4 .9 1.4 1.2 .8 .7 .5 .5 .4 .5 .5 .8 .5 .5 .4
.4 .5 .6 .9 1.1 .9 .6 1.0 1.4 1.1 .8 .6 .5 .5 .5 .5 .7 .5 .5 .5 .5 .5 .7 .9 .8 .7 .7 .5 .6 .5 .5 .5 .5 .5 .5 .4
.5 .7 .6 .5 .6 .5 .5 .6 .8 .9 .8 .6 .5 .5 .5 .5 .6 .5 .4 .4 .5 .6 .9 1.0 .9 .7 .5 .5 .5 .5 .4 .4 .5 .4 .4 .4
.5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .6 .7 .9 .9 .8 .7 .6 .5 .6 .7 .7 .6 .5 .4 .4 .5 .5 .5 .6 .6 .6 .5 .5 .5 .5 .5
.6 .6 .6 .6 .6 .6 .6 .7 .8 .8 .8 .9 .9 .8 .8 .7 .7 .7 .7 .7 .7 .7 .6 .6 .6 .6 .5 .5 .5 .5 .4 .5 .5 .6 .6 .6

TABLE 8

MONTHLY MONITORING OF MARINE SURFACE OBSERVATIONS (COSNA)
DATA TYPE:- DRIFTER
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures		
Period		:One calendar month.
Data monitored		:Reports from each unique identifier for drifting buoy.
Area monitored		:10°N - 80°N, 85°W - 0°W
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:All hours combined.
Elements monitored		:Mean sea-level pressure (hPa) :Wind speed (m s^{-1}) :Wind direction (degrees)
Parameters monitored		
	:NOBS	:Number of observations received excluding duplicates.
	:NGE	:Number of observations with gross errors.
	:PGE	:Percentage of observations with gross errors.
	:SD	:SD of difference of observations from background values excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors. **N.B. A positive bias indicates the observation is veered to the background**
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors
GROSS ERROR LIMITS	:15 hPa (pressure) :25 m s^{-1} (Vector Wind)	

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed > 5 m s^{-1}

IDENTIFIER	LAT.	LONG.	HOUR	ELEM	LEVEL	NOBS	NGE	PGE	SD	BIAS	RMS
MEAN SEA LEVEL PRESSURE											
39911	44.8	-54.2	ALL	P	SUR	3	0	0	0.5	1.6	1.7
39912	39.0	-67.7	ALL	P	SUR	46	0	0	1.3	-0.5	1.4
41505	37.3	-60.8	ALL	P	SUR	182	0	0	1.1	-0.2	1.1
41520	22.6	-58.1	ALL	P	SUR	270	0	0	0.8	-0.5	0.9
41521	24.1	-69.0	ALL	P	SUR	282	1	0	0.7	0.0	0.7
41524	18.2	-72.1	ALL	P	SUR	188	0	0	1.0	-0.2	1.1
41528	34.0	-62.3	ALL	P	SUR	311	0	0	1.0	0.1	1.0
41599	27.7	-36.9	ALL	P	SUR	1147	23	2	0.9	-0.3	1.0
41625	26.6	-73.6	ALL	P	SUR	278	0	0	0.8	0.2	0.8
41630	19.9	-49.0	ALL	P	SUR	265	0	0	0.9	0.0	0.9
41637	27.7	-46.0	ALL	P	SUR	50	0	0	0.8	0.6	1.0
41641	16.7	-53.9	ALL	P	SUR	214	0	0	0.8	0.5	1.0
41644	23.7	-51.8	ALL	P	SUR	269	0	0	0.9	-0.1	0.9
41651	26.1	-75.4	ALL	P	SUR	299	0	0	0.8	0.5	1.0
41671	27.0	-71.5	ALL	P	SUR	301	0	0	0.7	0.4	0.8
41853	34.9	-73.5	ALL	P	SUR	276	0	0	1.3	1.6	2.1
44513	46.6	-46.8	ALL	P	SUR	356	22	6	3.8	1.6	4.1
44514	50.4	-41.1	ALL	P	SUR	81	4	5	3.8	1.9	4.2
44516	45.8	-37.7	ALL	P	SUR	569	0	0	1.6	0.4	1.7
44517	47.3	-38.6	ALL	P	SUR	411	44	11	4.7	4.6	6.6
44525	40.3	-73.2	ALL	P	SUR	1	0	0	0.0	-1.3	1.3
44546	40.7	-31.6	ALL	P	SUR	1569	0	0	1.5	1.2	1.9
44607	52.3	-39.0	ALL	P	SUR	649	2	0	2.5	0.6	2.5
44608	40.6	-16.1	ALL	P	SUR	1569	0	0	1.0	0.0	1.0
44610	56.0	-34.8	ALL	P	SUR	1780	9	1	2.1	0.0	2.1
44613	28.2	-29.9	ALL	P	SUR	989	12	1	1.9	-0.4	2.0
44614	50.0	-20.3	ALL	P	SUR	1028	8	1	1.7	-0.8	1.8
44616	60.2	-7.4	ALL	P	SUR	769	5	1	1.6	0.2	1.6
44621	50.4	-14.5	ALL	P	SUR	1108	17	2	1.9	-0.6	2.0
44625	49.9	-12.8	ALL	P	SUR	1792	10	1	1.6	-0.2	1.6
44626	47.6	-41.4	ALL	P	SUR	1366	6	0	1.6	-0.1	1.6
44627	41.8	-41.7	ALL	P	SUR	1274	7	1	1.4	0.2	1.5
44628	40.6	-43.4	ALL	P	SUR	1179	4	0	1.5	0.5	1.6
44630	44.7	-28.3	ALL	P	SUR	1290	6	0	1.5	-0.3	1.5
44721	56.6	-28.2	ALL	P	SUR	1848	13	1	1.9	-0.8	2.1
44722	52.6	-36.9	ALL	P	SUR	1652	13	1	1.8	-0.5	1.9
44723	49.8	-39.6	ALL	P	SUR	614	2	0	2.1	0.3	2.1
44765	29.7	-54.2	ALL	P	SUR	539	8	1	1.1	-0.1	1.1
44766	53.8	-16.6	ALL	P	SUR	1400	14	1	2.0	-0.7	2.1
44773	63.4	-21.9	ALL	P	SUR	2260	19	1	2.0	-0.4	2.0
44777	55.9	-44.1	ALL	P	SUR	1781	16	1	2.1	-0.4	2.1
44805	42.9	-68.9	ALL	P	SUR	1	0	0	0.0	3.0	3.0
44808	40.5	-69.4	ALL	P	SUR	1	0	0	0.0	-1.8	1.8
44811	43.1	-66.6	ALL	P	SUR	3	0	0	3.8	3.8	5.4
44825	40.3	-73.2	ALL	P	SUR	1	0	0	0.0	-2.0	2.0
47553	70.8	-63.7	ALL	P	SUR	516	0	0	1.4	0.2	1.4
49912	21.8	-48.2	ALL	P	SUR	8	0	0	0.5	-1.1	1.2
49913	23.6	-40.9	ALL	P	SUR	1	0	0	0.0	-0.7	0.7
519449	32.4	-13.7	ALL	P	SUR	1	0	0	0.0	-0.1	0.1
52542	47.1	-59.8	ALL	P	SUR	18	18	100			
62506	37.8	-20.5	ALL	P	SUR	167	0	0	3.4	-3.7	5.0
62507	40.8	-22.6	ALL	P	SUR	1180	0	0	1.0	-0.2	1.1
62508	43.4	-16.3	ALL	P	SUR	1089	8	1	1.6	-0.9	1.8
62509	46.8	-10.4	ALL	P	SUR	1108	9	1	1.7	0.0	1.7
62510	48.9	-11.9	ALL	P	SUR	621	0	0	2.3	-0.1	2.3
62520	30.8	-29.3	ALL	P	SUR	989	4	0	0.8	-0.2	0.8
62554	34.1	-14.0	ALL	P	SUR	27	27	100			
62596	54.3	-29.1	ALL	P	SUR	626	4	1	2.2	0.4	2.2
62703	49.9	-2.9	ALL	P	SUR	1	0	0	0.0	0.2	0.2
62726	53.8	-3.6	ALL	P	SUR	1	0	0	0.0	-0.7	0.7

IDENTIFIER	LAT.	LONG.	HOUR	ELEM	LEVEL	NOBS	NGE	PGE	SD	BIAS	RMS
MEAN SEA LEVEL PRESSURE											
62787	57.9	0.0	ALL	P	SUR	1	0	0	0.0	3.5	3.5
62805	55.6	-12.9	ALL	P	SUR	1	0	0	0.0	-0.3	0.3
62829	48.7	-12.4	ALL	P	SUR	1	0	0	0.0	-0.5	0.5
63718	60.3	-4.0	ALL	P	SUR	1	0	0	0.0	-5.7	5.7
64516	64.8	-52.9	ALL	P	SUR	1379	0	0	1.8	0.6	1.9
64517	55.4	-48.7	ALL	P	SUR	1260	0	0	1.7	-0.2	1.8
64518	57.0	-26.7	ALL	P	SUR	1281	60	5	2.5	-0.8	2.6
64530	62.4	-25.5	ALL	P	SUR	1443	13	1	2.2	-0.7	2.3
64546	63.0	-21.7	ALL	P	SUR	1975	9	0	1.9	-0.9	2.1
64547	61.3	-27.4	ALL	P	SUR	955	4	0	2.1	-0.6	2.2
64698	59.1	-47.1	ALL	P	SUR	921	0	0	1.6	-0.3	1.6
64699	60.6	-51.9	ALL	P	SUR	942	0	0	1.4	0.0	1.4
64846	60.5	-5.0	ALL	P	SUR	1	0	0	0.0	0.6	0.6
65594	62.6	-35.0	ALL	P	SUR	1389	16	1	2.3	-0.8	2.5
65595	62.0	-19.3	ALL	P	SUR	1844	28	2	1.8	-0.8	2.0
65596	62.4	-22.4	ALL	P	SUR	1216	0	0	1.9	-0.6	2.0
65598	59.3	-39.9	ALL	P	SUR	879	42	5	2.3	-0.8	2.5
65599	59.9	-39.1	ALL	P	SUR	2109	17	1	2.2	-0.6	2.2
65600	60.0	-33.3	ALL	P	SUR	826	4	0	2.0	-0.6	2.1
887536	14.1	-18.3	ALL	P	SUR	1	0	0	0.0	-1.1	1.1
WIND SPEED											
39911	44.8	-54.2	ALL	SPEED	SUR	3	0	0	6.0	1.9	6.3
39912	39.0	-67.7	ALL	SPEED	SUR	46	0	0	3.0	2.8	4.1
41520	22.6	-58.1	ALL	SPEED	SUR	29	0	0	2.9	1.7	3.3
41521	24.1	-69.0	ALL	SPEED	SUR	262	0	0	1.3	-0.7	1.4
41625	26.6	-73.6	ALL	SPEED	SUR	240	0	0	1.3	-1.8	2.3
41630	19.9	-49.0	ALL	SPEED	SUR	256	0	0	2.6	0.4	2.6
41641	16.7	-53.9	ALL	SPEED	SUR	209	0	0	2.5	0.4	2.5
41644	23.7	-51.8	ALL	SPEED	SUR	11	0	0	1.4	-5.4	5.6
41651	26.1	-75.4	ALL	SPEED	SUR	21	0	0	3.3	5.8	6.7
44525	40.3	-73.2	ALL	SPEED	SUR	1	0	0	0.0	2.9	2.9
44607	52.3	-39.0	ALL	SPEED	SUR	632	0	0	3.0	1.0	3.2
44721	56.6	-28.2	ALL	SPEED	SUR	1383	0	0	2.6	-1.3	2.9
44773	63.4	-21.9	ALL	SPEED	SUR	1488	0	0	3.0	-0.1	3.0
44777	55.9	-44.1	ALL	SPEED	SUR	1300	0	0	2.5	-0.9	2.7
44805	42.9	-68.9	ALL	SPEED	SUR	1	0	0	0.0	-0.2	0.2
44808	40.5	-69.4	ALL	SPEED	SUR	1	0	0	0.0	-1.5	1.5
44811	43.1	-66.6	ALL	SPEED	SUR	2	0	0	4.9	-4.0	6.3
44825	40.3	-73.2	ALL	SPEED	SUR	2	0	0	2.6	1.2	2.9
49912	21.8	-48.2	ALL	SPEED	SUR	8	0	0	1.8	2.2	2.9
49913	23.6	-40.9	ALL	SPEED	SUR	1	0	0	0.0	2.7	2.7
519449	32.4	-13.7	ALL	SPEED	SUR	1	0	0	0.0	5.0	5.0
62506	37.8	-20.5	ALL	SPEED	SUR	625	0	0	1.8	0.9	2.0
62508	43.4	-16.3	ALL	SPEED	SUR	871	0	0	2.3	-0.4	2.4
62510	48.9	-11.9	ALL	SPEED	SUR	605	0	0	2.8	0.9	2.9
62703	49.9	-2.9	ALL	SPEED	SUR	1	0	0	0.0	2.3	2.3
62787	57.9	0.0	ALL	SPEED	SUR	1	0	0	0.0	-0.8	0.8
62805	55.6	-12.9	ALL	SPEED	SUR	1	0	0	0.0	-4.4	4.4
62829	48.7	-12.4	ALL	SPEED	SUR	1	0	0	0.0	-3.1	3.1
63718	60.3	-4.0	ALL	SPEED	SUR	1	0	0	0.0	11.6	11.6
64846	60.5	-5.0	ALL	SPEED	SUR	1	0	0	0.0	-0.7	0.7
887536	14.1	-18.3	ALL	SPEED	SUR	1	0	0	0.0	0.4	0.4
WIND DIRECTION											
39911	44.8	-54.2	ALL	DIRN.	SUR	3	0	0	4.7	-9.0	10.1
39912	39.0	-67.7	ALL	DIRN.	SUR	39	0	0	25.2	-9.2	26.8
41520	22.6	-58.1	ALL	DIRN.	SUR	24	0	0	14.4	-17.1	22.4
41521	24.1	-69.0	ALL	DIRN.	SUR	182	0	0	14.4	-18.2	23.2
41625	26.6	-73.6	ALL	DIRN.	SUR	120	0	0	15.1	7.6	16.9

IDENTIFIER	LAT.	LONG.	HOUR	ELEM	LEVEL	NOBS	NGE	PGE	SD	BIAS	RMS
WIND DIRECTION											
41630	19.9	-49.0	ALL	DIRN.	SUR	140	0	0	20.1	16.3	25.9
41641	16.7	-53.9	ALL	DIRN.	SUR	133	0	0	14.0	21.7	25.8
41651	26.1	-75.4	ALL	DIRN.	SUR	18	0	0	15.6	-16.3	22.5
44607	52.3	-39.0	ALL	DIRN.	SUR	599	0	0	25.5	-0.9	25.5
44721	56.6	-28.2	ALL	DIRN.	SUR	1282	0	0	22.3	5.3	22.9
44773	63.4	-21.9	ALL	DIRN.	SUR	1160	0	0	25.3	-4.0	25.6
44777	55.9	-44.1	ALL	DIRN.	SUR	1128	0	0	20.9	3.2	21.1
44805	42.9	-68.9	ALL	DIRN.	SUR	1	0	0	0.0	-12.6	12.6
44808	40.5	-69.4	ALL	DIRN.	SUR	1	0	0	0.0	-8.6	8.6
44811	43.1	-66.6	ALL	DIRN.	SUR	1	0	0	0.0	-3.8	3.8
44825	40.3	-73.2	ALL	DIRN.	SUR	2	0	0	4.9	-5.0	7.0
49912	21.8	-48.2	ALL	DIRN.	SUR	5	0	0	21.2	-3.0	21.4
49913	23.6	-40.9	ALL	DIRN.	SUR	1	0	0	0.0	-4.9	4.9
519449	32.4	-13.7	ALL	DIRN.	SUR	1	0	0	0.0	-7.5	7.5
62506	37.8	-20.5	ALL	DIRN.	SUR	494	0	0	17.1	-14.6	22.4
62508	43.4	-16.3	ALL	DIRN.	SUR	664	0	0	19.3	-4.6	19.9
62510	48.9	-11.9	ALL	DIRN.	SUR	544	0	0	21.1	1.3	21.1
62703	49.9	-2.9	ALL	DIRN.	SUR	1	0	0	0.0	-23.7	23.7
62787	57.9	0.0	ALL	DIRN.	SUR	1	0	0	0.0	14.7	14.7
62829	48.7	-12.4	ALL	DIRN.	SUR	1	0	0	0.0	3.4	3.4
63718	60.3	-4.0	ALL	DIRN.	SUR	1	0	0	0.0	13.1	13.1
64846	60.5	-5.0	ALL	DIRN.	SUR	1	0	0	0.0	8.0	8.0

TABLE 9

MONTHLY MONITORING OF AIRCRAFT OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures:		
Period		:One calendar month.
Data monitored		:Statistics for each airline carrier.
Area monitored		:40°N - 70°N, 60°W - 0°W.
Standard of comparison		:Background field from UKMO global model.
Observation times		:All hours combined.
Level(s) monitored		:300.0 - 150.0 hPa
Elements monitored		:TEMP in °C ; WIND in m s^{-1}
Parameters monitored	:N REP.	:Number of observations received excluding duplicates.
	:PG	:Percentage of observations with gross errors.
	:PR	:Percentage of observations rejected by quality control including rejections from the duplicate check.
	:PC	:Percentage of observations with calm winds.
	:RMS	:Root Mean Square difference of observations from background values excluding those with gross errors in Temperature & vector wind.
	:BIAS	:Mean difference of observations from background values excluding those with gross errors in Temperature & vector wind.

GROSS ERROR LIMITS :10.0 °C ; 60 m s^{-1} Vector Wind

SELECTION CRITERIA :N REP $\geq$ 20

NB: All American ACARS data are grouped together and statistics are shown at the bottom of the table as "US ACARS". All ADS reports are similarly grouped together.

		TEMPERATURE					WIND			
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
AAL	2762	1	4	1.6	0.0	2748	0	4	0	8.3	0.9
ACA	1214	0	3	2.0	-0.1	1248	0	3	0	7.4	0.3
AEA	152	3	8	2.3	0.5	150	1	7	0	9.7	0.5
AEL	285	0	100	2.2	-1.1	285	0	18	0	9.0	0.5
AEY	34	0	0	2.1	0.9	36	0	0	0	7.3	0.5
AFL	343	1	4	1.8	0.1	345	0	3	0	7.5	1.0
AFR	1146	1	10	1.9	0.2	1161	0	11	0	8.5	1.0
AIH	275	1	5	2.1	0.1	278	0	6	0	8.9	0.9
AJM	95	0	5	1.8	-0.4	97	1	7	0	10.6	1.4
AMM	71	0	6	2.0	1.0	72	0	7	0	7.4	0.1
AMX	194	3	5	1.9	0.4	192	0	7	0	11.8	0.0
ANZ	139	0	13	2.0	-1.2	141	0	13	0	7.2	-0.2
AOM	381	0	3	1.7	0.5	392	0	5	0	8.6	0.7
AUA	21	0	0	1.3	0.9	21	0	5	0	11.4	0.1
AVA	197	1	5	1.9	0.0	200	1	6	0	11.0	0.4
AVE	26	0	12	1.3	-0.5	27	0	15	0	13.0	1.3
AZA	413	2	100	2.4	0.8	426	0	7	0	8.2	-0.1
BAL	224	1	15	2.0	-0.2	226	0	14	0	7.8	1.4
BAW	1229	0	8	1.9	-0.1	1245	0	9	0	8.3	1.0
BBB	24	0	0	1.4	-0.2	25	0	0	0	7.5	-1.3
BLX	38	0	3	1.6	-0.1	37	0	3	0	7.6	2.9
BWA	92	2	11	2.0	1.0	94	2	14	0	11.5	1.6
CDN	637	0	3	1.5	0.0	644	0	3	0	7.4	0.7
CFC	32	9	9	1.9	1.5	32	0	6	0	10.7	1.4
CFG	711	0	2	1.8	-0.8	724	0	3	0	8.2	0.7
CKS	27	0	0	2.1	-1.3	28	0	0	0	7.4	1.7
CKT	77	0	6	2.3	1.7	78	1	6	0	5.8	0.1
CLX	276	1	2	1.6	-0.4	280	0	3	0	8.5	0.8
CMM	59	0	12	3.3	1.6	63	0	10	0	9.4	0.7
COA	676	1	4	1.7	-0.2	678	0	11	0	13.5	2.1
CRL	219	1	4	1.7	0.6	233	1	6	0	8.3	1.3
CTB	96	1	5	1.6	-0.6	100	0	9	0	8.4	1.6
CUB	200	1	4	2.1	1.3	199	0	8	0	11.2	-0.3
DAL	1429	0	15	1.9	-0.3	1452	0	15	0	8.8	0.7
DBY	270	0	2	1.7	-0.5	269	1	4	0	8.7	1.0
DLH	1810	0	7	1.9	-0.2	1818	0	7	0	8.2	1.0
EEZ	82	4	39	5.5	4.2	81	0	11	0	7.7	1.0
ELY	126	0	4	1.8	-0.2	133	0	5	0	8.4	1.6
ETH	34	0	15	1.4	0.3	38	0	16	0	7.2	1.8
EWW	121	0	4	1.6	0.4	127	0	7	0	8.5	2.3
FDX	509	1	7	1.9	0.1	527	0	8	0	10.6	1.6
FIN	439	0	3	1.6	0.2	432	0	3	0	7.4	0.6
GAF	21	0	0	1.2	-0.6	21	0	0	0	5.5	-0.5
GCO	32	3	3	1.4	0.3	32	0	13	0	15.7	7.0
GRL	43	0	0	1.4	-0.2	43	0	0	0	5.5	0.6
GTI	169	0	13	2.7	0.4	171	1	12	0	9.5	0.2
HLF	48	0	4	2.6	-0.6	48	0	4	0	9.1	1.7
IBE	1143	1	11	2.0	0.6	1162	1	13	0	9.7	0.8
ICE	1224	0	3	1.7	0.0	1211	0	3	0	7.5	0.8
IWD	34	3	3	1.1	-0.6	34	0	0	0	8.2	-0.8
JKK	174	1	13	2.4	-0.3	164	1	9	0	8.1	0.7
KLM	1765	0	9	2.0	0.4	1803	0	9	0	8.1	0.5
LDA	81	1	11	1.7	-0.8	80	3	18	0	10.0	1.3
LDI	315	0	100	2.9	-0.1	321	0	12	0	8.6	0.2
LIB	107	3	5	1.5	0.6	114	1	4	0	11.1	1.3
LOT	136	0	4	1.8	-1.1	135	0	6	0	7.8	0.8
LTU	407	1	6	1.7	-0.4	410	0	6	0	8.9	1.4
MAS	36	0	8	2.3	0.2	37	0	8	0	8.8	1.3
MON	57	2	2	1.9	-0.7	58	0	0	0	6.0	0.8

	TEMPERATURE					WIND					
IDENT.	N.REP.	PG	PR	RMS	BIAS	N.REP.	PG	PR	PC	RMS	BIAS
MPD	69	1	3	1.9	0.4	71	0	4	0	9.0	1.0
MPH	516	0	3	1.9	-0.8	522	0	3	0	8.4	0.5
NCA	30	0	0	1.2	-0.1	28	0	0	0	6.4	1.6
NVR	25	4	4	1.2	0.5	25	0	8	0	10.0	-1.8
NWA	2691	1	2	1.8	0.4	2624	0	3	0	8.0	1.0
OAL	38	0	3	0.9	-0.3	41	0	2	0	5.5	0.0
PAC	65	2	100	1.9	0.5	68	0	15	0	11.0	1.0
PIA	21	0	0	2.5	-0.1	23	0	0	0	6.6	-0.4
RAM	33	0	6	2.5	-0.5	33	0	9	0	7.7	-0.7
RCH	88	0	8	2.2	0.3	89	1	15	0	12.5	3.3
RJA	20	0	5	1.7	-0.1	21	0	5	0	7.8	1.4
RRR	59	0	8	2.3	-0.5	60	0	7	0	8.1	1.8
SAB	60	2	12	2.4	0.5	61	0	8	0	9.0	1.6
SAS	1353	0	19	1.6	-0.3	1351	0	19	0	7.3	0.5
SIA	90	1	3	1.7	-0.9	91	0	5	0	8.5	0.0
SLR	109	0	18	1.8	-1.0	109	2	19	0	6.8	0.3
SNB	79	13	30	4.1	2.8	79	0	8	0	8.0	0.8
SVA	125	0	6	2.0	-0.1	129	0	7	0	8.7	0.9
SWR	59	3	7	1.7	0.5	62	0	8	0	11.5	2.6
TAP	267	1	5	1.6	-0.1	266	1	9	0	10.7	0.5
TCU	20	0	5	1.9	-0.7	21	0	5	0	6.1	-1.0
TOW	164	1	5	2.2	0.8	165	2	11	0	12.0	1.2
TSC	27	0	0	1.7	1.2	28	4	7	0	11.5	-0.4
TWA	1058	0	5	2.1	0.1	998	0	6	0	8.5	1.2
UAL	1785	0	5	1.9	-0.2	1811	0	5	0	7.1	0.7
UPS	755	0	10	2.0	0.6	761	0	10	0	7.9	0.8
USA	341	1	2	1.7	-0.2	271	0	3	0	8.4	0.4
VIR	593	1	3	1.7	-0.3	607	0	4	0	8.9	1.3
VKG	38	0	8	2.6	-0.2	39	0	5	0	8.8	0.4
WOA	81	0	10	1.4	0.2	91	0	11	0	7.0	1.2
BA	2281	0	7	1.5	0.3	2268	0	7	0	6.0	0.8
EU	10399	0	18	1.5	-0.2	10399	0	18	0	6.4	0.9
KL	4162	0	9	1.6	0.7	4151	0	8	0	7.0	1.3
LH	639	0	6	1.7	1.0	639	0	6	0	6.2	1.3
N	273	1	4	2.1	0.3	283	0	4	0	8.3	0.7
US ACARS	12076	0	24	1.7	0.6	12075	0	18	0	7.0	0.9

TABLE 10

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:100 hPa.
Element monitored		:GEOPOTENTIAL HEIGHT in metres
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:SD	:SD of difference of observations from background values at level shown excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.1

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	SD	RMS	BIAS
ARRAN	00	Z	100	1	0	0.0	17.0	17.0
ARRAN	12	Z	100	1	0	0.0	8.0	8.0
DBLK	12	Z	100	8	0	10.5	30.0	28.1
DNRS	00	Z	100	1	0	0.0	16.0	16.0
ELML7	00	Z	100	1	0	0.0	22.0	22.0
ELML7	12	Z	100	3	0	9.0	21.6	19.7
F/RS	00	Z	100	1	0	0.0	31.0	31.0
FNOR	00	Z	100	10	0	13.6	27.9	24.3
FNOR	12	Z	100	13	0	13.4	23.3	19.1
FNOU	00	Z	100	16	0	10.8	29.9	27.9
FNOU	12	Z	100	18	0	15.3	31.2	27.2
FNPH	00	Z	100	10	0	14.7	26.6	22.2
FNPH	12	Z	100	10	0	17.1	24.9	18.1
FNRS	00	Z	100	13	0	13.7	29.5	26.1
FNRS	12	Z	100	9	0	18.7	28.1	21.0
JIVB	00	Z	100	1	0	0.0	68.0	68.0
LDWR	00	Z	100	27	0	13.6	16.5	-9.4
LDWR	12	Z	100	24	0	9.6	15.1	-11.7
OVYA2	00	Z	100	15	0	15.5	16.1	4.3
OVYA2	12	Z	100	15	0	10.7	11.5	4.1
OXTS2	00	Z	100	1	0	0.0	15.0	15.0
OXTS2	12	Z	100	1	0	0.0	2.0	-2.0
OXYH2	00	Z	100	13	0	20.8	26.8	16.8
OXYH2	12	Z	100	13	0	24.1	28.9	15.9
S6LA	00	Z	100	5	0	6.0	27.5	26.8
S6LA	12	Z	100	4	0	21.5	21.5	1.3
UCKZ	00	Z	100	1	0	0.0	46.0	46.0
03953	00	Z	100	23	0	12.8	18.9	13.9
03953	12	Z	100	25	1	14.8	14.8	0.6
04018	00	Z	100	30	0	17.6	18.3	4.9
04018	12	Z	100	29	0	16.7	16.7	1.0
04220	00	Z	100	29	0	16.7	17.0	3.7
04220	12	Z	100	31	0	15.7	16.3	-4.4
04270	00	Z	100	28	0	20.7	22.9	-9.8
04270	12	Z	100	30	0	15.6	23.2	-17.1
04339	00	Z	100	28	0	18.3	18.6	3.2
04339	12	Z	100	31	0	13.4	13.5	1.4
04360	00	Z	100	28	0	17.2	17.8	4.8
04360	12	Z	100	30	0	16.7	16.7	0.3
08001	00	Z	100	24	0	23.4	32.5	-22.6
08001	12	Z	100	27	1	23.6	33.2	-23.4
08508	00	Z	100	22	0	13.2	22.4	18.0
08508	12	Z	100	31	0	13.3	22.0	17.6
08522	00	Z	100	1	0	0.0	0.0	0.0
08522	12	Z	100	30	0	7.1	20.2	18.9
08594	00	Z	100	1	0	0.0	20.0	20.0
08594	12	Z	100	19	0	19.6	34.0	27.8
60020	00	Z	100	1	0	0.0	0.0	0.0
60020	12	Z	100	1	0	0.0	37.0	37.0
71600	00	Z	100	31	0	14.3	17.2	9.6
71600	12	Z	100	30	0	11.3	11.7	3.0
72201	00	Z	100	30	0	16.5	19.9	11.1
72201	12	Z	100	31	0	16.4	22.6	15.5
72402	00	Z	100	29	0	19.7	30.1	22.8
72402	12	Z	100	31	0	22.4	26.0	13.2
74494	00	Z	100	25	0	19.4	21.4	9.0
74494	12	Z	100	30	0	14.2	15.0	-5.1
78016	00	Z	100	1	0	0.0	10.0	10.0
78016	12	Z	100	29	0	14.5	48.5	46.3

TABLE 11

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures:

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:500 hPa.
Element monitored		:GEOPOTENTIAL HEIGHT in metres
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:SD	:SD of difference of observations from background values at level shown excluding those with gross errors.
	:BIAS	:Mean difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.1

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	SD	RMS	BIAS
ARRAN	00	Z	500	1	0	0.0	4.0	-4.0
ARRAN	12	Z	500	1	0	0.0	11.0	11.0
DBLK	12	Z	500	9	0	6.5	14.6	13.0
DNRS	00	Z	500	1	0	0.0	2.0	2.0
ELML7	00	Z	500	4	0	8.3	12.8	9.8
ELML7	12	Z	500	4	0	6.6	14.1	12.5
F/RS	00	Z	500	1	0	0.0	4.0	4.0
FNOR	00	Z	500	11	0	10.4	13.9	9.2
FNOR	12	Z	500	13	0	6.0	8.8	6.4
FNOU	00	Z	500	18	0	8.0	12.8	9.9
FNOU	12	Z	500	18	0	8.1	16.2	14.0
FNPH	00	Z	500	12	0	12.5	12.5	0.1
FNPH	12	Z	500	10	0	12.7	12.8	1.6
FNRS	00	Z	500	14	0	7.2	10.5	7.7
FNRS	12	Z	500	10	0	12.2	16.0	10.3
JIVB	00	Z	500	1	0	0.0	15.0	15.0
LDWR	00	Z	500	27	0	10.4	10.6	2.1
LDWR	12	Z	500	26	0	10.0	10.7	-3.7
OVYA2	00	Z	500	18	0	12.4	18.0	13.1
OVYA2	12	Z	500	16	0	12.7	15.6	9.1
OXTS2	00	Z	500	2	0	18.0	23.4	15.0
OXTS2	12	Z	500	1	0	0.0	20.0	-20.0
OXYH2	00	Z	500	13	0	10.0	16.4	12.9
OXYH2	12	Z	500	13	0	10.2	16.5	13.0
S6LA	00	Z	500	5	0	12.4	12.4	0.2
S6LA	12	Z	500	4	0	19.5	19.8	-3.3
UCKZ	00	Z	500	1	0	0.0	8.0	8.0
03953	00	Z	500	30	0	9.5	14.9	11.6
03953	12	Z	500	30	1	13.1	16.0	9.2
04018	00	Z	500	31	0	12.3	17.0	11.6
04018	12	Z	500	29	0	10.6	15.4	11.1
04220	00	Z	500	30	0	10.1	13.1	8.3
04220	12	Z	500	31	0	11.6	11.6	0.2
04270	00	Z	500	31	0	12.9	19.5	14.7
04270	12	Z	500	31	0	15.1	16.6	7.0
04339	00	Z	500	28	0	12.5	18.5	13.6
04339	12	Z	500	31	0	10.8	17.5	13.7
04360	00	Z	500	29	0	15.1	16.7	7.1
04360	12	Z	500	30	0	16.2	16.4	2.7
08001	00	Z	500	25	1	16.3	16.8	-4.0
08001	12	Z	500	27	1	12.2	12.8	-3.9
08508	00	Z	500	23	0	11.3	11.4	1.5
08508	12	Z	500	31	0	9.6	11.9	7.1
08522	00	Z	500	1	0	0.0	21.0	-21.0
08522	12	Z	500	30	0	10.2	17.3	14.0
08594	00	Z	500	1	0	0.0	15.0	15.0
08594	12	Z	500	21	0	7.0	9.6	6.6
60020	00	Z	500	23	0	13.4	17.5	11.3
60020	12	Z	500	25	0	11.3	16.3	11.8
71600	00	Z	500	31	0	12.1	12.1	1.3
71600	12	Z	500	30	0	10.5	11.1	3.6
72201	00	Z	500	31	0	14.7	15.5	5.1
72201	12	Z	500	31	0	5.6	6.2	2.8
72402	00	Z	500	29	0	11.4	11.4	-0.1
72402	12	Z	500	31	0	9.3	9.3	0.1
74494	00	Z	500	31	0	14.9	14.9	1.1
74494	12	Z	500	31	0	7.1	7.5	2.5
78016	00	Z	500	1	0	0.0	8.0	8.0
78016	12	Z	500	29	0	5.3	19.4	18.7

TABLE 12

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:100 hPa.
Element monitored		:VECTOR WIND in $m\ s^{-1}$
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:UBIAS,VBIAS	:Mean difference of observations of U and V components from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.2

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	% REJ	RMS	UBIAS	VBIAS
ARRAN	00	V	100	1	0	0	0.0	-7.6	2.4
ARRAN	12	V	100	1	0	0	0.0	-4.8	3.6
DBLK	12	V	100	6	0	0	5.0	-0.4	-1.4
DNRS	00	V	100	1	0	0	5.0	-1.7	3.8
ELML7	00	V	100	1	0	0	5.0	-1.5	10.7
ELML7	12	V	100	2	0	0	5.0	0.6	1.5
FNOR	00	V	100	9	0	0	5.0	0.8	1.4
FNOR	12	V	100	12	0	0	5.0	-0.5	-0.2
FNOU	00	V	100	17	0	0	4.0	0.7	-0.8
FNOU	12	V	100	18	0	0	3.1	0.5	-1.5
FNPH	00	V	100	8	0	0	4.6	2.9	-1.1
FNPH	12	V	100	9	0	0	4.6	-1.5	0.9
FNRS	00	V	100	12	0	0	4.6	0.9	1.0
FNRS	12	V	100	9	0	0	3.1	1.7	0.0
JIVB	00	V	100	1	0	0	3.1	2.5	3.5
LDWR	00	V	100	27	0	0	3.1	0.6	-0.5
LDWR	12	V	100	26	0	0	2.5	-0.5	-1.1
OVYA2	00	V	100	13	0	0	2.4	1.8	-1.0
OVYA2	12	V	100	11	0	0	3.0	1.0	-1.1
OXTS2	00	V	100	1	0	0	2.6	-2.1	-5.5
OXTS2	12	V	100	1	0	0	2.6	-5.7	-2.0
OXYH2	00	V	100	10	0	0	2.6	-1.0	-1.4
OXYH2	12	V	100	11	0	0	2.4	0.3	-0.9
S6LA	00	V	100	5	0	0	2.2	0.3	-0.8
S6LA	12	V	100	4	0	0	2.2	2.1	-1.3
03953	00	V	100	19	0	0	2.9	0.0	0.9
03953	12	V	100	25	0	0	3.5	0.8	0.6
04018	00	V	100	27	0	0	3.6	0.7	-0.5
04018	12	V	100	29	0	0	2.6	0.3	-0.5
04220	00	V	100	26	0	0	2.1	0.9	0.2
04220	12	V	100	28	0	0	2.9	0.7	-0.1
04270	00	V	100	27	0	0	2.6	0.1	0.1
04270	12	V	100	28	0	0	3.8	1.1	0.1
04339	00	V	100	27	0	0	2.1	0.5	-0.8
04339	12	V	100	31	0	3	4.3	1.8	-0.7
04360	00	V	100	28	0	0	5.3	-0.1	0.9
04360	12	V	100	29	0	0	2.2	-0.5	0.3
08001	00	V	100	22	0	0	3.1	0.7	0.8
08001	12	V	100	25	0	0	4.2	-1.1	0.9
08508	00	V	100	18	0	0	3.0	3.3	0.6
08508	12	V	100	24	0	0	4.1	-0.5	-1.1
08522	12	V	100	6	0	0	3.1	-1.4	0.8
08594	00	V	100	1	0	100	3.7	-1.9	9.4
08594	12	V	100	21	0	100	3.7	0.9	3.1
60020	00	V	100	1	0	0	4.1	-3.2	13.6
60020	12	V	100	1	0	0	4.1	-2.4	2.7
71600	00	V	100	31	0	0	6.4	0.8	0.1
71600	12	V	100	30	0	0	3.0	0.4	0.5
72201	00	V	100	30	0	0	4.3	0.4	1.4
72201	12	V	100	31	0	0	4.2	-1.7	1.8
72402	00	V	100	26	0	0	1.5	1.0	-1.5
72402	12	V	100	29	0	0	3.9	2.7	-0.7
74494	00	V	100	21	0	0	2.9	-0.8	-0.1
74494	12	V	100	27	0	0	3.2	0.3	0.0
78016	00	V	100	1	0	0	5.7	0.8	2.1
78016	12	V	100	29	0	0	5.7	1.2	0.8

TABLE 13

MONTHLY MONITORING OF RADIOSONDE OBSERVATIONS (COSNA)
MONITORING CENTRE: BRACKNELL
MONTH: December 1999

Monitoring procedures

Period		:One calendar month.
Data monitored		:Reports from selected radiosonde TEMPs.
Area monitored		:0°N - 90°N, 100°W - 40°E
Standard of comparison		:Background field from UKMO global model.
Position		:Average latitude and longitude for period.
Observation times		:00, 12 UTC.
Level monitored		:500 hPa.
Element monitored		:VECTOR WIND in m s^{-1}
Parameters monitored	:NUM OBS	:Number of observations available at level shown during period.
	:NUM GROSS	:Number of gross errors at level shown during period.
	:UBIAS,VBIAS:	Mean difference of observations of U and V components from background values at level shown excluding those with gross errors.
	:RMS	:Root Mean Square difference of observations from background values at level shown excluding those with gross errors.

GROSS ERROR LIMITS :Defined in Appendix I.2

WMO IDENT	OBS TIME	ELM	LEV	NUM OBS	NUM GROSS	% REJ	RMS	UBIAS	VBIAS
ARRAN	00	V	500	1	0	0	0.0	-0.9	1.4
ARRAN	12	V	500	1	0	0	0.0	0.1	-3.1
DBLK	12	V	500	7	0	0	4.0	2.2	-1.3
DNRS	00	V	500	1	0	0	4.0	-1.5	0.5
ELML7	00	V	500	4	0	0	4.0	-1.4	-0.3
ELML7	12	V	500	4	0	0	4.0	1.4	1.5
F/RS	00	V	500	1	0	0	4.0	0.5	2.1
FNOR	00	V	500	10	0	0	4.0	0.1	0.6
FNOR	12	V	500	13	0	0	2.5	-0.5	1.3
FNOU	00	V	500	17	0	0	2.8	-1.4	-0.6
FNOU	12	V	500	18	0	0	2.6	0.0	0.4
FNPH	00	V	500	10	0	0	4.5	-0.4	-1.8
FNPH	12	V	500	8	0	0	5.5	-2.2	-0.3
FNRS	00	V	500	14	0	0	5.5	0.1	0.5
FNRS	12	V	500	9	0	0	2.3	-0.8	-1.3
JIVB	00	V	500	1	0	0	2.3	-1.2	-2.8
LDWR	00	V	500	27	0	0	2.3	0.1	0.1
LDWR	12	V	500	26	0	0	2.9	-0.3	-0.2
OVYA2	00	V	500	17	0	0	3.0	-1.4	1.6
OVYA2	12	V	500	14	0	0	5.1	-1.2	-0.9
OXTS2	00	V	500	2	0	0	4.9	-4.2	-1.4
OXTS2	12	V	500	1	0	0	4.9	-1.8	5.3
OXYH2	00	V	500	13	0	0	4.9	-1.1	0.0
OXYH2	12	V	500	10	0	0	2.5	-2.7	-1.5
S6LA	00	V	500	5	0	0	4.3	-2.1	0.3
S6LA	12	V	500	4	0	0	4.3	2.8	-1.0
03953	00	V	500	30	0	0	4.1	0.1	0.2
03953	12	V	500	31	0	0	4.5	1.7	0.5
04018	00	V	500	31	0	0	5.3	0.8	0.7
04018	12	V	500	29	0	0	3.6	-0.6	-1.7
04220	00	V	500	27	0	0	2.7	0.3	0.2
04220	12	V	500	27	0	0	4.9	0.8	0.3
04270	00	V	500	29	0	0	4.1	-1.6	-0.4
04270	12	V	500	28	0	0	3.3	-1.0	-1.7
04339	00	V	500	27	0	0	3.4	0.1	0.1
04339	12	V	500	31	0	0	5.9	1.2	-0.8
04360	00	V	500	29	0	0	4.0	0.5	0.1
04360	12	V	500	30	0	0	4.5	-0.9	0.0
08001	00	V	500	26	0	0	4.1	0.0	1.4
08001	12	V	500	28	0	0	4.1	0.0	-1.0
08508	00	V	500	18	0	0	3.7	0.6	-0.6
08508	12	V	500	25	0	0	2.9	-0.1	-0.4
08522	12	V	500	6	0	0	3.5	-0.2	1.7
08594	00	V	500	1	0	100	5.1	-1.5	-0.2
08594	12	V	500	22	0	100	5.1	-0.8	3.4
60020	00	V	500	21	0	0	3.1	-0.6	0.9
60020	12	V	500	24	0	0	3.8	0.4	0.2
71600	00	V	500	31	0	0	3.6	0.0	1.1
71600	12	V	500	30	0	0	4.2	1.4	1.8
72201	00	V	500	30	0	0	5.0	1.0	-0.5
72201	12	V	500	31	0	0	2.6	0.2	0.9
72402	00	V	500	29	0	0	2.2	0.3	0.0
72402	12	V	500	30	0	0	3.6	0.8	1.2
74494	00	V	500	31	0	0	3.4	-1.0	0.0
74494	12	V	500	31	0	0	3.8	-0.3	0.6
78016	00	V	500	1	0	0	3.3	-0.9	3.8
78016	12	V	500	29	0	0	3.3	0.9	0.7

APPENDIX I

1. The gross error limits for observation minus background differences of geopotential height in Tables 5, 10 and 11 are:-

Level (hPa)	Geopotential height (metres)
1000	100
850	100
700	100
500	150
400	175
300	200
250	225
200	250
150	275
100	300
70	375
50	400
30	450

The weighted RMS values used in Table 5,10 and 11 are calculated using the following weights:-

Level (hPa)	Weight
1000	3.70
850	3.40
700	2.90
500	2.20
400	1.90
300	1.60
250	1.50
200	1.37
150	1.19
100	1.00
70	0.87
50	0.80
30	0.64

2. The gross error limits for observation minus background differences of windspeed in Tables 6,12 and 13 are:-

Level (hPa)	Windspeed $m\ s^{-1}$
1000	35
850	35
700	40
500	45
400	50
300	60
250	60
200	50
150	50
100	45